DECEMBER, 1954

PIPE LINE INDUSTRY

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CONSTRUCTION • OPERATIONS • MAINTENANCE

FILE COPY SENT TO L. C.

Human Maintenance

Here's how one company cut down on the incidence of common ailments through periodic physical examinations.

Page 50

DEC 31 1954

nstruments Carry Load

A closer look at another of the stations that Interstate Oil Pipe Line Company made from portable pumping units.

Page 54

loise a Nemesis?

It was in Texas-Illinois' compressor engine rooms. But they did something about it and improved operating efficiency.

Page 58

Turn page for additional contents and a Quick Review of this issue

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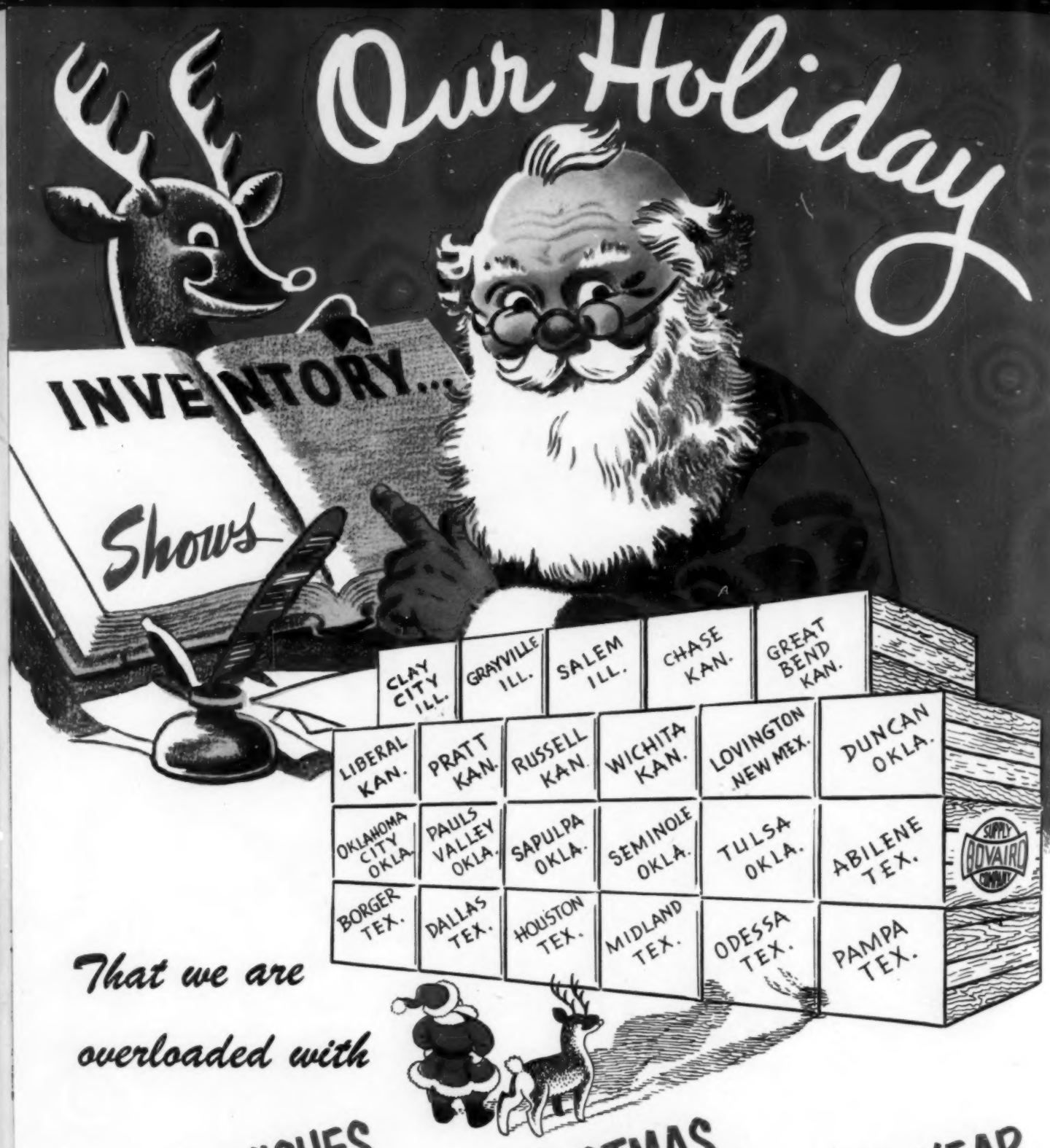

That we are overloaded with

GOOD WISHES *for a* MERRY CHRISTMAS *and a* HAPPY NEW YEAR *for you!*

THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

83 YEARS OF PROGRESS WITH THE OIL INDUSTRY

DEC 10 1954

PIPE LINE INDUSTRY

CONTENTS and Quick Review

December, 1954 Vol. 1, No. 6

To help you put first things first, scan these time-saving digests, checking ☑ those you want to read first.

(Other articles listed on Front Cover)

How Emergency Repair Kit Works

☐ You asked us how the emergency repair kit mentioned on Page 70 of the October issue of PLI works. So here's some more information on the unit that was devised by Gulf Interstate Pipe Line Company.

Page 57

Corrosion Survey Saves $26,000

☐ Every corrosion protection problem is different and must be solved accordingly. When Plaines Pipe Line Company had to lay an eight-inch line in Wyoming, it was figured that the coating would cost approximately $30,000. But a soil resistivity survey revealed that with the exception of a few hot spots, the line would easily last as long as it was needed. So the hot spots were coated with tape and magnesium anodes were applied. The cost: $4000.

By Wayne A. Johnson.....Page 63

HOW to Be Interviewed

☐ More and more executives are being asked for interviews. Some aren't faring so well. Are you? If not, here are six helpful suggestions.

By Auren Uris.....Page 64

Good Old Days?

☐ Whenever pipeliners gather talk usually gets around to the "good old days." But were they? We've collected a series of pictures, one of which appears in this issue of PLI. You be the judge.

Page 65

El Paso's Unattended Station

☐ A four-engine reciprocating station, complete with dehydration plant, operates unattended 24 hours per day in the rugged Largo Canyon of New Mexico. The nearest road is 45 miles away. It's El Paso Natural Gas Company's biggest little station that not only compresses gas but dehydrates it as well.

By Frank J. Mangan.....Page 66

Dehydration of Light Hydrocarbon Liquids

☐ The conclusion of a three-part article on products dehydration features distillation drying and testing the produce for water content. While distillation drying is not so prevalent as dry desiccant dehydration, it costs less and operating costs are lower. Regardless of the method used in dehydration, it is necessary to measure the water content of the fluid. Five different methods are discussed.

By John M. Campbell.....Page 70

"Scotch" Nipple for Internal Corrosion Studies

☐ A "Scotch" nipple developed by United Gas Pipe Line Company engineers enables technicians to insert coupons into a line while it is operating for corrosion studies. The coupons can be withdrawn and re-inserted at will.

Page 72

Hydrogen Blisters in Gas Lines

☐ Line breaks and blowouts have been caused by hydrogen blisters inside natural gas pipe lines. The atomic hydrogen that causes the blisters comes from weak acids formed by water and CO_2 and H_2S. This article tells how they are caused and how they can be prevented.

By Filipe Paredes and W. W. Mize.....Page 74

Evaluating the Performance of Motors

☐ Here is Part 2 of an article that answers many pertinent questions on electric motor performance. Some of them are:

- How important is starting torque?
- Reduced voltage starting?
- What about the reduction of air gap to improve power factor?

By E. B. Turner.....Page 79

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FYI from PLI

FYI in journalese is "for your information," or something we think you should know. With this issue, PIPE LINE INDUSTRY is six months old. An offshoot of our sister publication, WORLD OIL, PLI is now a lusty youngster with a circulation of 4500 and the full approval of the pipe line industry. A recent reader survey convinced us of the latter.

Your approval of what you've read the past six months has helped us formulate some big plans for the future. Plans that are making PLI synonymous with the best in pipe line reading.

The Editor

PIPE LINE INDUSTRY published every month. Entered as second class mail matter July 9, 1954, at the post office at Houston, Texas, under the act of March 3, 1879.

Competition at Work

A radical change has taken place in the U. S. oil business in a remarkably short period of time. Rapid expansion has built up surplus producing, refining and transportation facilities. As recently as late 1952, the industry was straining for new supplies and new capacity to meet the needs of expanded consumption. In 1954, industry is ahead in capacity.

Some estimates have placed producing ability as high as 2 million barrels per day above current needs. Estimates of refining capacity indicate something like a spare of around 15 percent exists.

While demand in 1955 is expected to be 5 percent larger than in 1954, even without further expansion the industry will have a substantial margin of surplus capacity. However, this does not mean that exploration and drilling activity will stop, nor that pipe line and refining construction will cease.

•

Competition in industry will cause a considerable amount of additional building in the years ahead. There will always be some firms needing more production even though the nation has a surplus. They will step up drilling to obtain production. New producing fields will require pipe line outlets. Other concerns will put in new pipe lines or buy new barges to insure more efficient transportation. Some refiners will add distillation or cracking units to get more or better capacity. Still other refiners will make new or better products.

Competition will have to match the advantages offered by these new installations. Competing companies cannot stand idly by and watch others benefit by gaining competitive advantages. For example, when one large diameter pipe line was built from the Rocky Mountain area to the Midwest, two other lines were built soon afterward.

Spectacular progress has been made in product pipe lines. There has been an expansion in construction of these lines. Each new line built will cause other companies to look into the possible advantages they might gain here and there by constructing pipe lines. We can look forward to considerably more product line construction.

In other words, the industry's highly competitive nature will breed further building despite creation of surplus capacities in recent years.

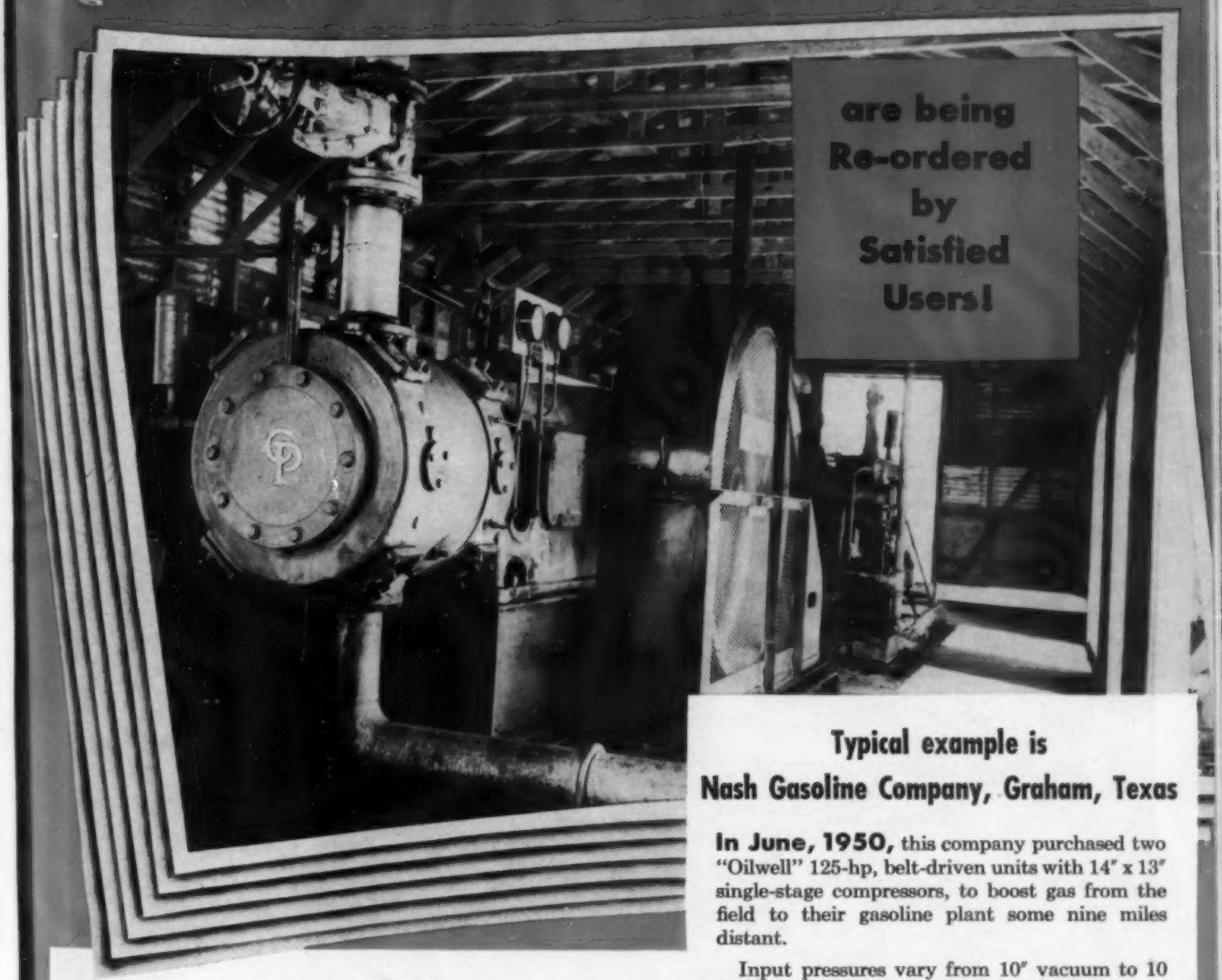
•

This means the industry will continue to maintain surplus capacities. It means severe competition will exist for years to come. It means continued large capital investments in the years ahead for new production, pipe line and refining facilities.

It also means the industry is going to have to live with substantial spare capacity. Excess capacities will be an economic problem. Some concerns may be hurt. Industry management is going to have to deal wisely with the situation to escape being hurt. Those who lag behind in keeping up with their competitors are the ones who will be hurt the most.

Warren L. Baker

MORE and MORE "OILWELL" GAS-COMPRESSOR UNITS



Typical example is Nash Gasoline Company, Graham, Texas

In June, 1950, this company purchased two "Oilwell" 125-hp, belt-driven units with 14" x 13" single-stage compressors, to boost gas from the field to their gasoline plant some nine miles distant.

Input pressures vary from 10" vacuum to 10 psi for this operation, and corresponding outputs are in the 60 to 75 psi range. Depending upon gasoline plant operations, from 650,000 to 1,000,000 cu. ft. per day of gas is handled by each unit.

According to Mr. G. R. Paull, Manager of Nash Gasoline Company, the consistently good performance which the company has received from these units, together with low maintenance costs throughout the three-year period these units have been in service, was directly responsible for their decision to re-order additional "Oilwell" units for their expanding facilities.

When you have GAS PUMPING Problems

. . . let your "Oilwell" Representative quote on the "Oilwell" Unit that meets your requirements most economically, throughout the 20 to 300 hp range.

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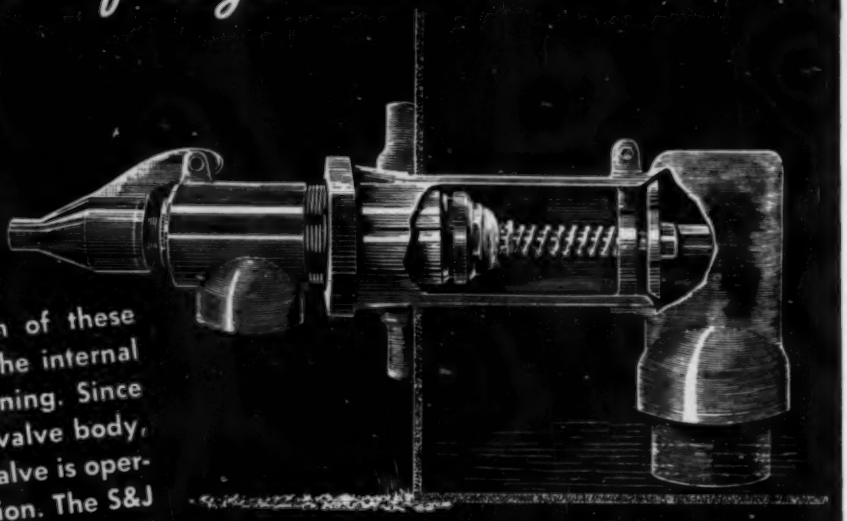
BUTTON UP YOUR TANK'S OVERCOAT

with S&J Anti-freeze Drain Valve

With winter on its way, that is figuratively what you do when you install Shand & Jurs Anti-Freeze Drain Valves in your petroleum storage tanks. The S&J Anti-Freeze Drain Valve is designed to draw off the water that accumulates in the bottom of these tanks. It is so constructed that the internal parts of the valve are self draining. Since water does not stay inside the valve body, freezing is prevented and the valve is operable under any weather condition. The S&J Anti-Freeze Drain Valve, designated by S&J as Fig. ST-2001, is adaptable to any type of petroleum tank.



Above: Fig. ST-2001 AV Anti-Freeze Drain Valve with auxiliary valve which permits removal of the Drain Valve from a tank without draining tank contents.

At the right: Fig. ST-2001 Anti-Freeze Drain Valve with adapter for Cone roof tanks.

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The S&J Anti-Freeze Drain Valve, Fig. ST-2001 is available in 2", 3" and 4" sizes. Illustrated at the right.

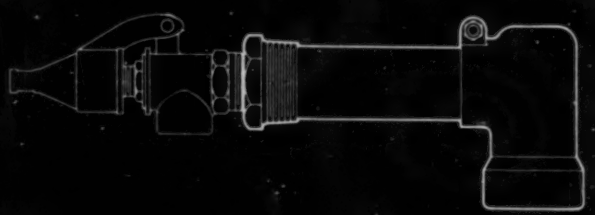

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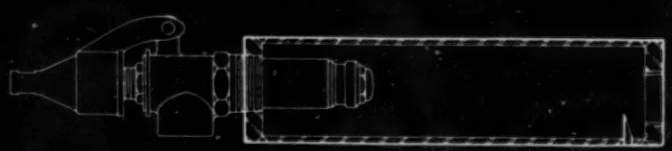
Fig. ST-2001 S Anti-Freeze Drain Valve with eccentric sleeve, designed for use in Spheroids and other tanks with curved bottoms.



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PIPE LINE INDUSTRY

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PIPE LINE INDUSTRY for the oil and gas pipe line industry.

WORLD OIL and **THE COMPOSITE CATALOG** for the drilling-producing-pipe line industry.

PETROLEUM REFINER and **THE REFINERY CATALOG** for the refining-natural gasoline-petrochemical industry.

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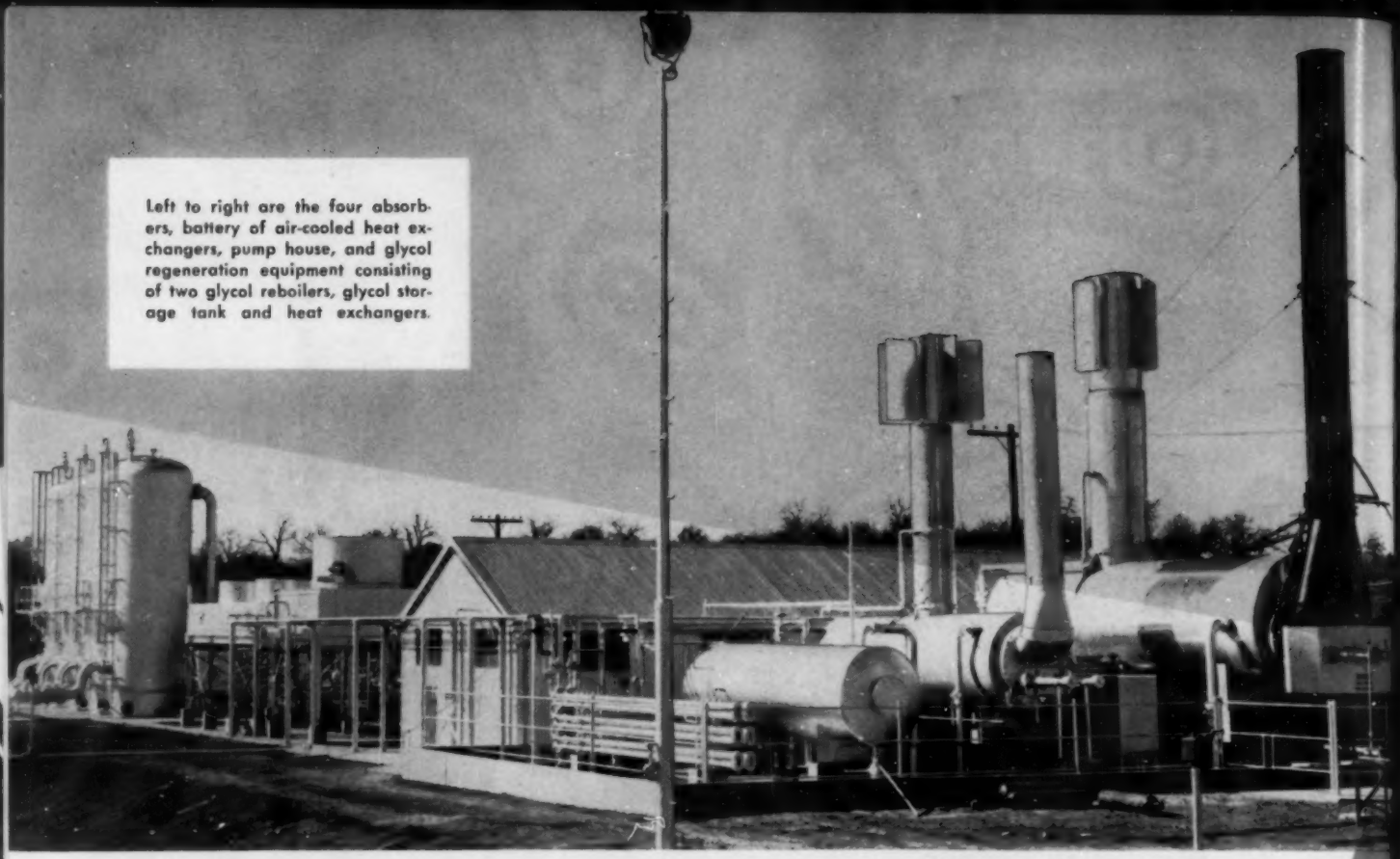

Left to right are the four absorbers, battery of air-cooled heat exchangers, pump house, and glycol regeneration equipment consisting of two glycol reboilers, glycol storage tank and heat exchangers.

560,000,000

SCF OF RESERVOIR GAS PER DAY...

. . . Can Be Dried In This BS&B Built Dehydration Plant At Depew, Oklahoma!

When Oklahoma Natural Gas Co. wanted to double the capacity of their Dehydration Plant serving their 57 billion cubic foot underground gas reservoir near Depew, Oklahoma, they called in BS&B — designers and builders of the original plant.

The job was accomplished within a few months by the addition of two new absorbers, and by doubling the capacity of the cooling system and the glycol reactivation equipment. At the same time, provision was made for additional plant expansion when the need arises.

Present capacity of the plant is 560,000,000 SCF/D at 800 psi pressure. During one month when 4,600,000,000 cubic feet of gas was withdrawn from the reservoir and processed through the new plant, the amount of moisture removed from the gas was equivalent to 20,000 gallons of water!

If you have a dehydration problem —at the well head, at a field processing installation or along the pipeline—why not take advantage of BS&B's many years of successful experience in solving it? Your BS&B Representative will be glad to discuss it with you . . . or you may write

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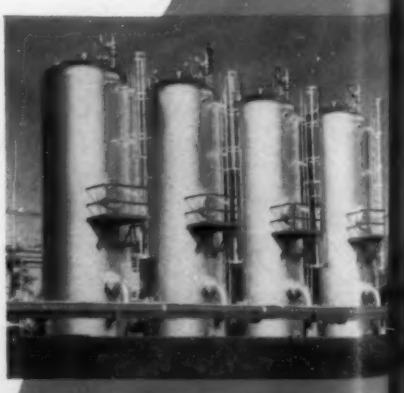

Close-up of the four absorbers where the moisture-laden gas gives up its water vapor to a circulating solution of lean triethylene glycol. They are 21 feet high and 8 feet in diameter.

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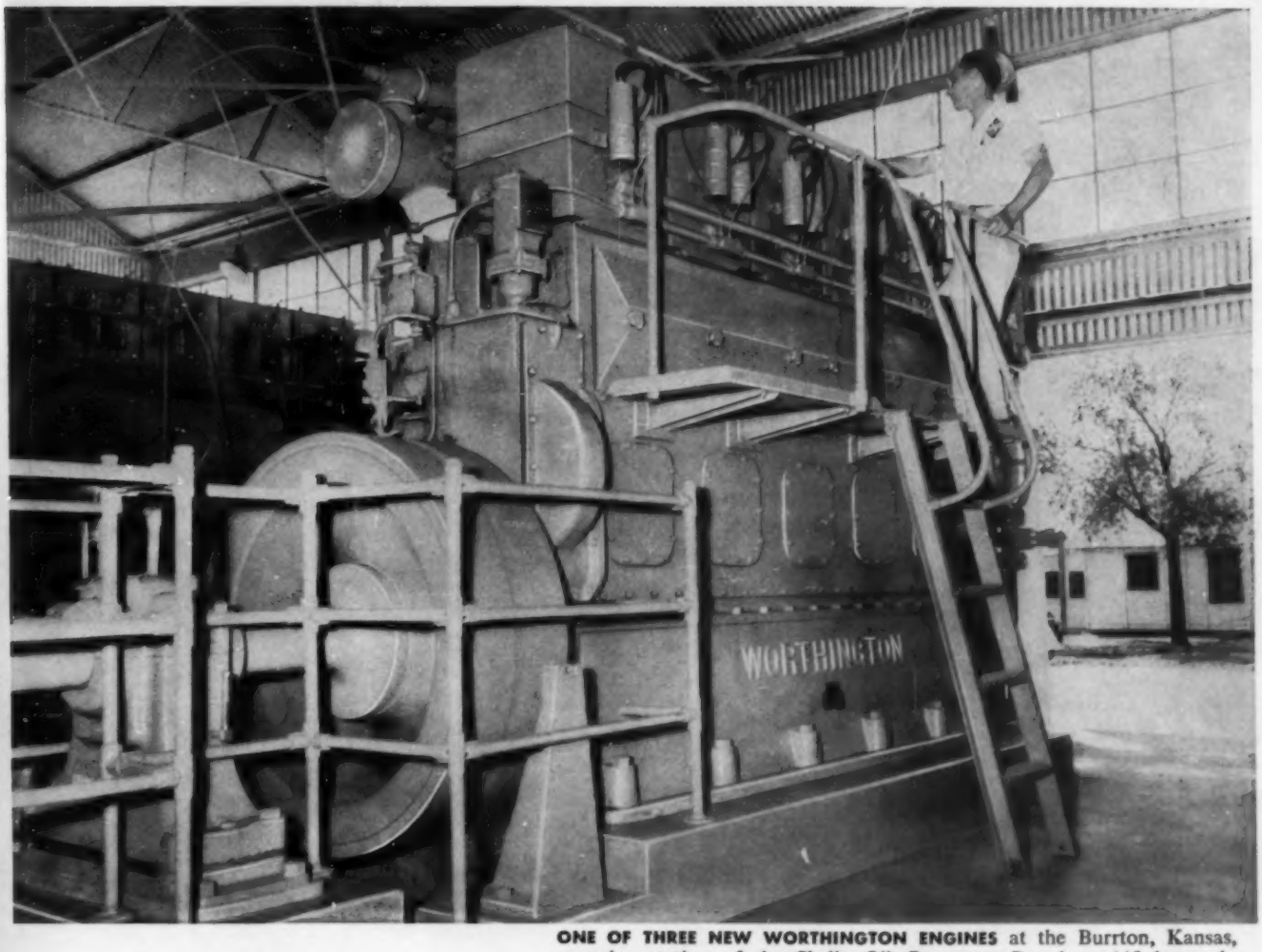
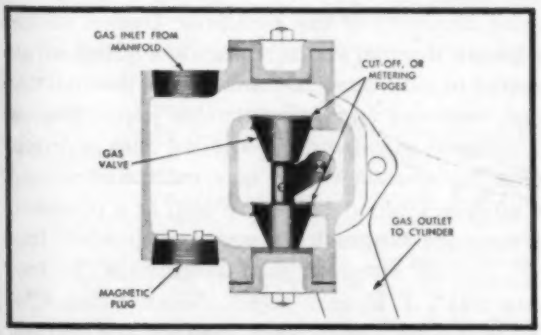


ONE OF THREE NEW WORTHINGTON ENGINES at the Burrton, Kansas, pumping station of the Skelly Oil Company. Rated at 445 hp each, these engines drive centrifugal pumps through step-up gears.

Skelly Oil buys three more Worthington engines



MICRO-METERING GAS VALVES used on all Worthington spark-ignition and dual-fuel engines assure equal cylinder loading, smooth running at all loads, better speed regulation, and lower maintenance.

You find out a lot about the performance of engines when you live with them 16 years.

Skelly Oil Company had that long to assess two Worthington gas engines installed in 1936 in their old pumping station at Burrton, Kansas. Driving centrifugal pumps through step-up gears, the Worthingtons did a fine job in moving crude oil 52 miles to the Skelly refinery in El Dorado. So when the time came to rebuild the Burrton Station with enlarged capacity, Worthington engines again received the nod from Skelly engineers.

Repeat business like this isn't exactly a surprise to Worthington. But it's still good to know that our old customers — people who have given our engines a real workout for years — keep coming back to us for additional equipment. Let us help with *your* power problems — write Worthington Corporation, Engine Division, Section E.4.6, Buffalo, New York. E.4.6

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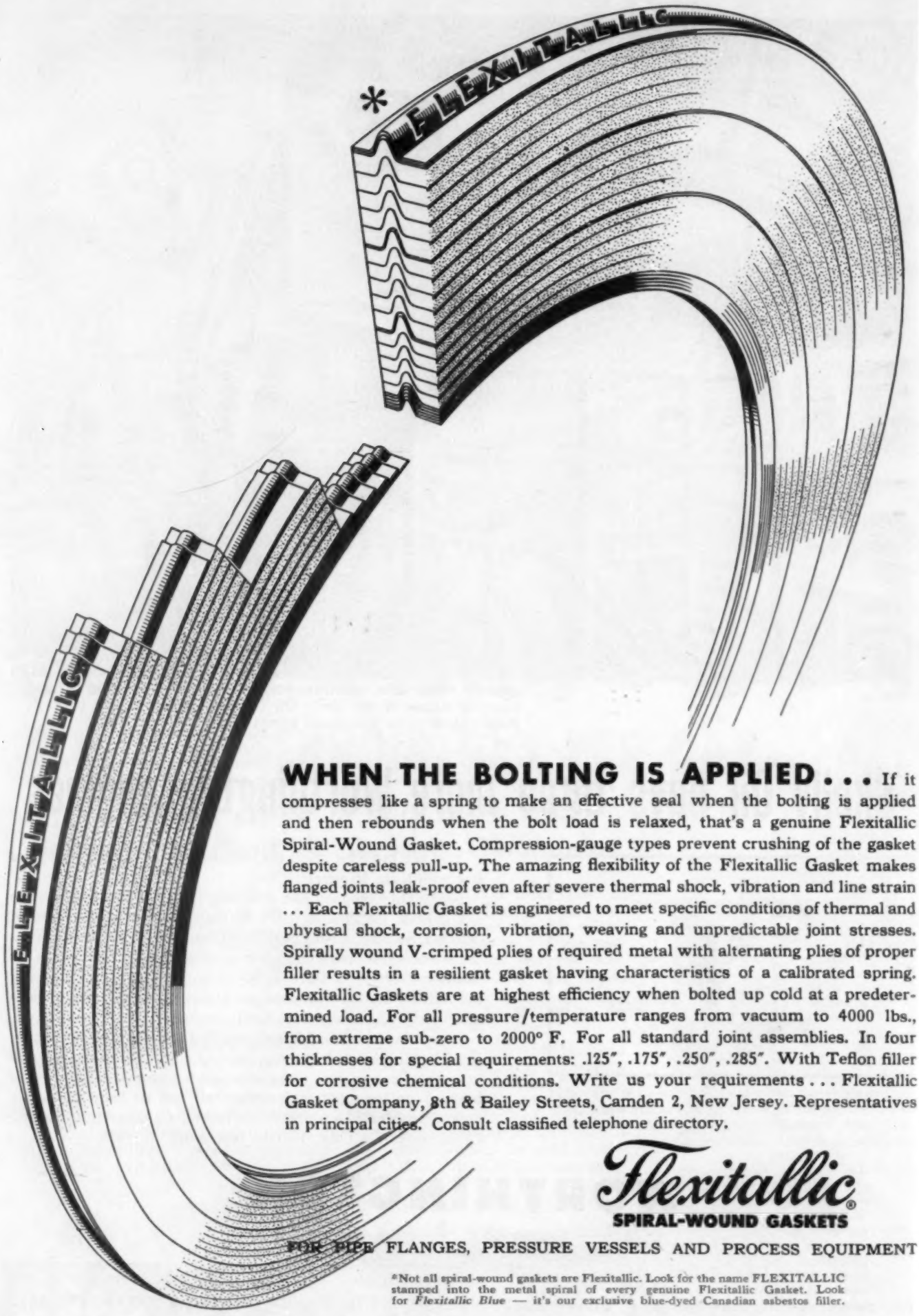
Economical, Continuous Power — Diesel, Dual-Fuel and Spark-Ignition Engines, from 200 to 5000 bhp.



WHEN THE BOLTING IS APPLIED . . . If it compresses like a spring to make an effective seal when the bolting is applied and then rebounds when the bolt load is relaxed, that's a genuine Flexitallic Spiral-Wound Gasket. Compression-gauge types prevent crushing of the gasket despite careless pull-up. The amazing flexibility of the Flexitallic Gasket makes flanged joints leak-proof even after severe thermal shock, vibration and line strain . . . Each Flexitallic Gasket is engineered to meet specific conditions of thermal and physical shock, corrosion, vibration, weaving and unpredictable joint stresses. Spirally wound V-crimped plies of required metal with alternating plies of proper filler results in a resilient gasket having characteristics of a calibrated spring. Flexitallic Gaskets are at highest efficiency when bolted up cold at a predetermined load. For all pressure/temperature ranges from vacuum to 4000 lbs., from extreme sub-zero to 2000° F. For all standard joint assemblies. In four thicknesses for special requirements: .125″, .175″, .250″, .285″. With Teflon filler for corrosive chemical conditions. Write us your requirements . . . Flexitallic Gasket Company, 8th & Bailey Streets, Camden 2, New Jersey. Representatives in principal cities. Consult classified telephone directory.

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PIPE LINE PROGRESS

298 MILES OF A. O. SMITH LINE PIPE

helps Service Pipe Line transport "crude" from the Rockies

Service Pipe Line Company now provides a new outlet for Rocky Mountain and Williston Basin Production. Starting at Fort Laramie, Wyoming, the line traverses the southeastern part of the state, Southwestern Nebraska, Northeastern Colorado and the State of Kansas, with a small segment in Western Missouri which connects with Service Pipe Line Company's main North-South system. The initial capacity of the line is to be 160,000 barrels a day. Eventually capacity will reach 200,000 barrels.

It will transport crude oil produced in Wyoming and other sections of the Rocky Mountain area, the Denver-Julesburg Basin and the production of Western and West-central Kansas.

A. O. Smith supplied almost half the 628 mile line — a total of 298 miles in 20 inch and 22 inch diameters. To meet Service Pipe Line's schedules, this pipe was shipped simultaneously from both A. O. Smith Corporation at Milwaukee and A. O. Smith Corporation of Texas.

For over 26 years A. O. Smith has practiced a rigid and high-standard quality control over exacting manufacturing specifications. That's why A. O. Smith pipe made and installed in 1928 is still in operation. That's why nearly every important high pressure line is wholly or in part A. O. Smith pipe.

A. O. Smith line pipe is available in a complete range of sizes and wall thicknesses — from 8⅝ in. to 30 in. diameters.

A. O. Smith also makes the famous "SW-80", E-7010 electrode for field welding of line pipe. Just one electrode for stringer, hot, filler and finish passes.

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the dirt flies faster—now with MUSCLES OF STEEL

Straining laborers plying pick and shovel are a bygone memory because of today's excavating and road-building equipment. Modern power shovels and draglines use *muscles of steel*—rugged wire rope—to keep the dirt flying fast.

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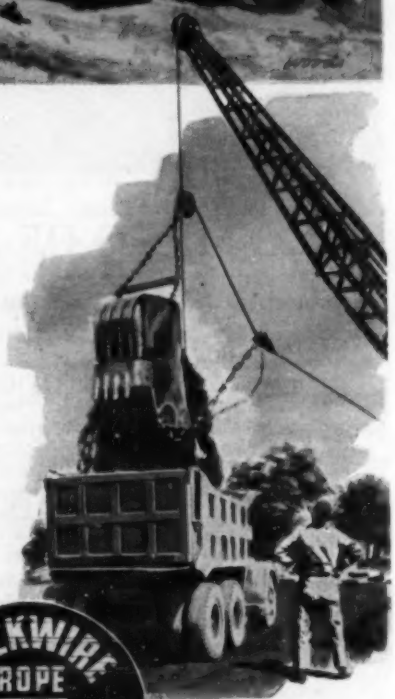
You'll find Wickwire Rope, too, in the mines and the quarries . . . in the oil fields and logging camps . . . with the fishing fleets . . . and in numerous materials handling operations. Whatever the job may be, the extra care and quality fabrication that goes into Wickwire Rope proves itself in longer life, more economical service and utmost reliability.



every industry benefits from wire rope

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Small Enough to Give You Personal Service
Big Enough to Do The Job

Many River Construction pipeline jobs are repeat contracts from companies who have used us before. These companies have found the value of doing business with our organization; we have all the equipment, the personnel, *and* the experience necessary to complete jobs of any size on schedule. Every partner of our organization averages well over twenty years of pipeline experience — your job will benefit from this "know how" when you call on River.

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For more data on advertised products, use Readers' Service Cards, last page.

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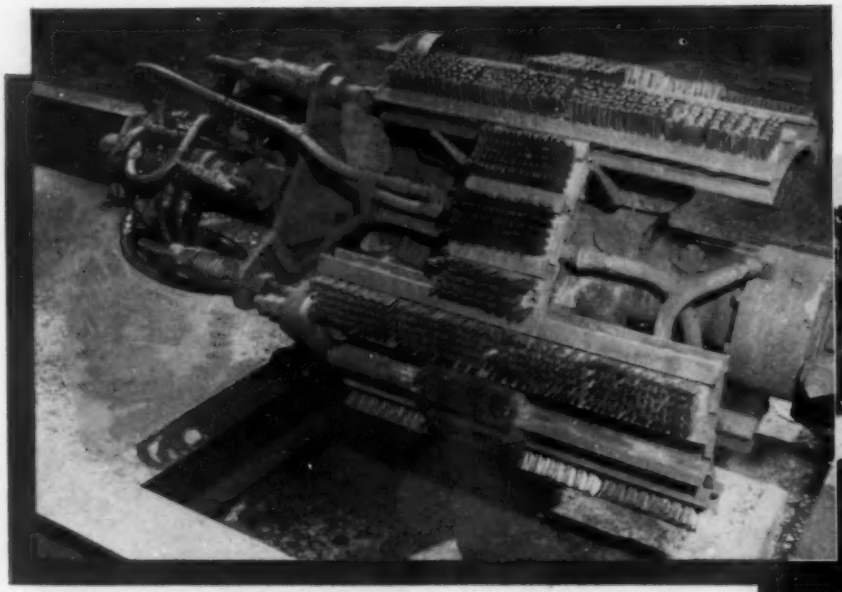
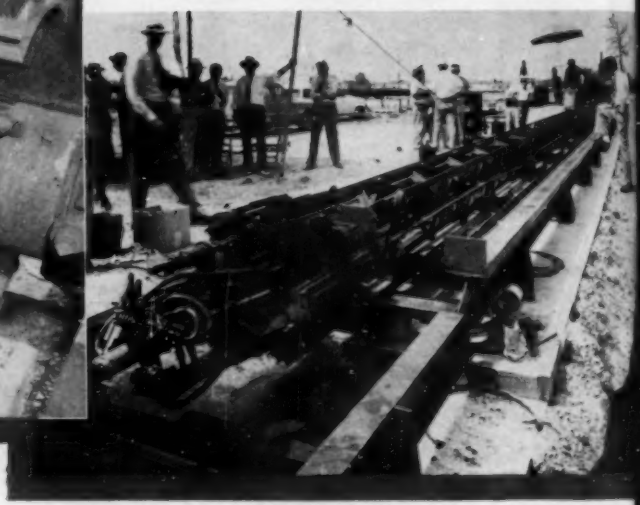


The heart of the C-R-C internal cleaning and coating machine is this head which rotates at 250 rpm. The wire brushes clean the pipe and corrosion-resistant coating is sprayed from the guns at the left.



This over-all view shows the rotating head and the shaft which drives it through the pipe.

The rotating head enters the pipe after it has been clamped on the rack to begin the cleaning-coating operation.

This tractor drives the cleaning head through the pipe. Coating for the spray guns is in the tank in front of the operator.

Increased production through improved flow in your pipelines is now possible with the use of C-R-C's revolutionary new internal cleaning and painting machine. This new machine cleans the interior of the pipe and coats it in one automatic operation. Internal cleaning gives a smooth abrasion-resistant surface resulting in reduced turbulence and friction for substantially increased flow.

After the cleaning operation the machine coats the interior with a corrosion-resistant Epon® resin paint, developed in cooperation with Coast Paint & Lacquer Co., Inc. The unit is designed to provide pipe joints with this smooth interior surface and protective coating when they are received from the mill. Its use is also recommended on pipe that has been in storage for long periods to remove rust and corrosion before it is laid.

The new unit is an EXCLUSIVE* development of C-R-C. It is completely portable and can be used for stationary or on-the-job installations. The cleaned and coated, abrasion-resistant surface is desirable for use in gas pipelines as well as products and crude-oil lines. Consult C-R-C on this new pipeline development for improving production in your lines.

*Patent pending

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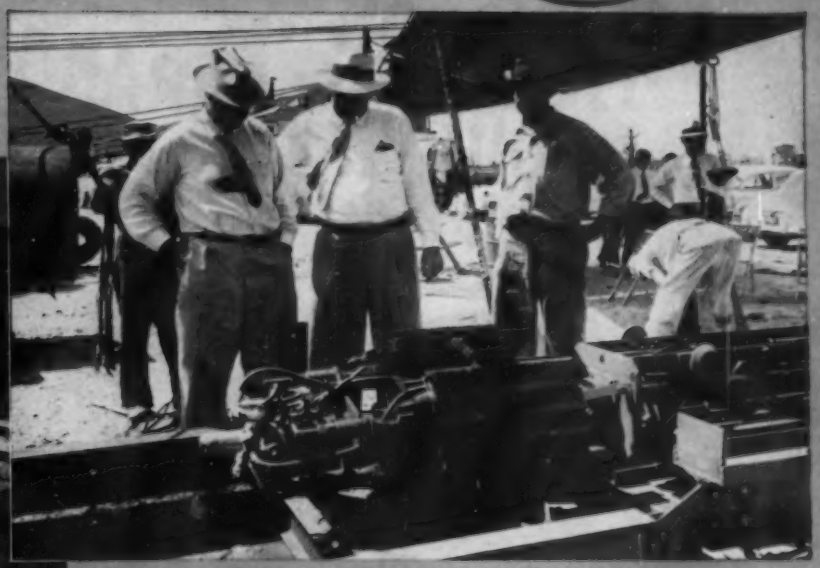
C-R-C has been First with every major development in pipeline equipment

DEVELOPMENT AND COATING OF PIPE

A supply of 5-gallon cans of special "Copon" formulated for C-R-C pipe application.



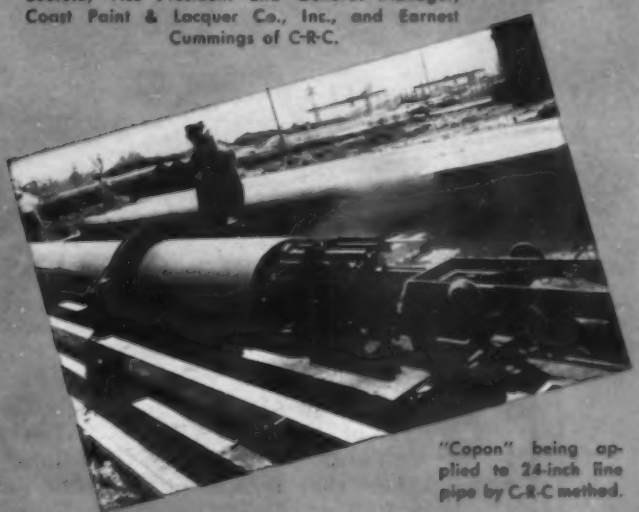
Left to right — Jim D. Cummings of C-R-C, Carl Seefeld, Vice President and General Manager, Coast Paint & Lacquer Co., Inc., and Earnest Cummings of C-R-C.

"COPON" . . . our Epon® resin coating is used by C-R-C for protection and preservation of line pipe.

Our chemists and engineers — working for weeks in close association with Mr. Jim Cummings — have developed and perfected the special "Copon" formula for the coating used in the revolutionary new C-R-C line pipe cleaning and coating process.

"Copon" adds years to the life and usefulness of line pipe.

- **It assures installation of rust-free pipe.**
- **It has exceptional tenacity, will adhere to metal surfaces longer and under more difficult conditions than any other coating yet tested.**
- **It is abrasion-resistant and has proven low erosion rate.**
- **It gives positive protection against rust and corrosion, also the chemical effects of crude oil, natural gas and salt water.**
- **It has amazing flexibility and elasticity.**
- **It provides a silky smooth, even surface that increases line flow by reducing friction.**



"Copon" being applied to 24-inch line pipe by C-R-C method.

Above the business end of C-R-C cleaner and "Copon" application.

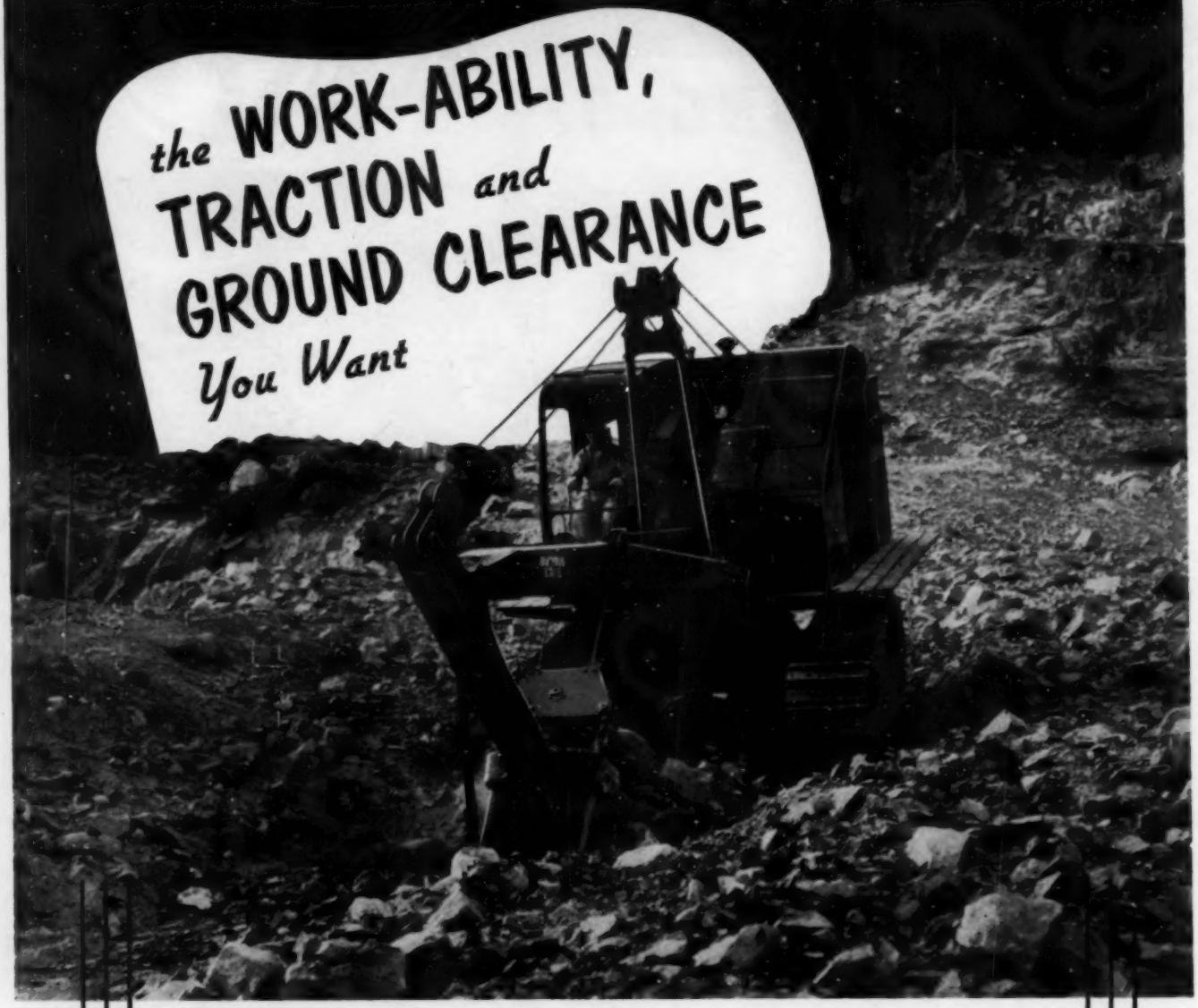
COAST Paint & Lacquer Co. Inc.

P. O. Box 1113 Houston, Texas

Specializing in Protective Coatings and finishes for Industry

BUCYRUS-ERIE 22-B DRAGSHOVELS OFFER

the WORK-ABILITY, TRACTION *and* GROUND CLEARANCE *You Want*



REAL WORK-ABILITY — Individual Design of the Bucyrus-Erie 22-B — as with every other model in the line — means that it is designed from the ground up to handle its rated load. There is no over-powering or over-dippering of one model to create another "new" model. Speed, power and weight are properly balanced. Rapid swing and hoist, together with a powerful digging stroke, mean more yards of trench every shift. Pin-point control eliminates handwork.

PLENTY OF TRACTION — With tractor-type treads, the 22-B dragshovel will move over soft or rough ground, up steep slopes. Deep grousers provide the bite to keep going.

MORE GROUND CLEARANCE—Tractor-type treads raise ground clearance on the 22-B dragshovel to 20¾-in. — enough to assure clearing of most obstructions along a right-of-way.

See your Bucyrus-Erie distributor soon for the full story on 22-B dragshovels for economical overall pipeline excavation. They're fully convertible in the field to crane, dragline, or shovel front ends. 18E54

SOUTH MILWAUKEE WISCONSIN

BUCYRUS ERIE

Let's get technical about WALWORTH LUBRICATED PLUG VALVES for pipeline service

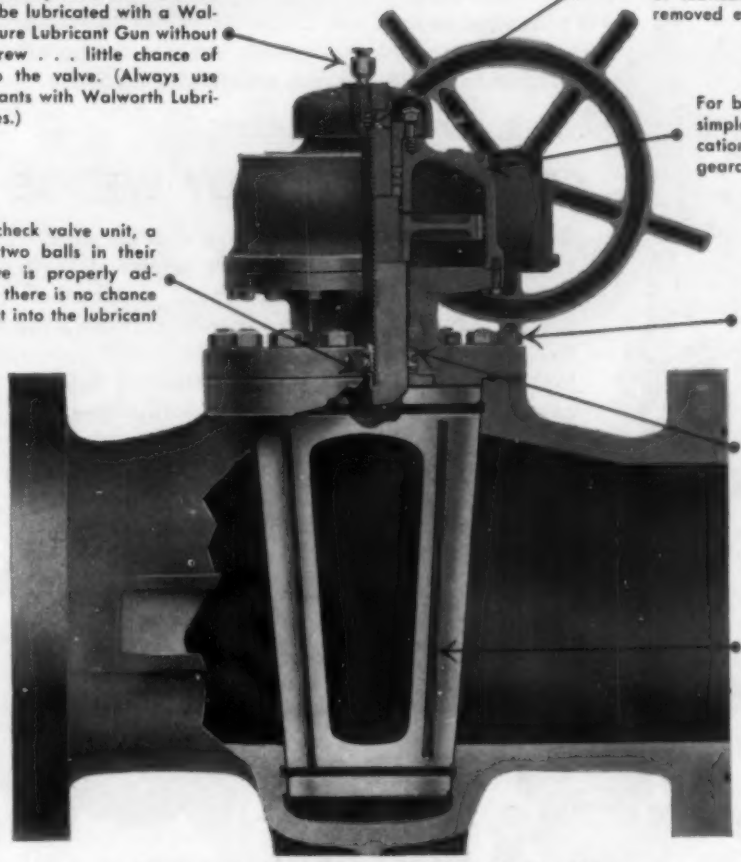
Combination button-head lubricant fitting and lubricant screw is provided at no extra cost. Valves can be lubricated with a Walworth High Pressure Lubricant Gun without removing the screw . . . little chance of grit getting into the valve. (Always use Walworth Lubricants with Walworth Lubricated Plug Valves.)

An added safety feature in the form of a groove cut part way up side of the lubricant-fitting screw allows the operator to observe any tendency of lubricant to blow out *before* the screw is removed entirely.

For buried pipelines — yoke design permits simple attachment of handwheel and lubrication extensions without modifying the gearcase.

In the stainless steel check valve unit, a transverse pin holds two balls in their seats. When the valve is properly adjusted and lubricated, there is no chance for line pressure to get into the lubricant system.

Standard bolt threads, rather than fine threads, mean easy replacement of nuts and bolts from local stocks.



Two overlapping Teflon packing rings form an effective seal against possible leakage without "grabbing" the plug shank. Low breakout torque . . . plug turns easier. Packing serves only as a seal and is not used to hold the plug in its seat.

Lubricant grooves completely frame the port openings and encircle the plug at the top and bottom assuring a tight seal against leaks. Bottom circumferential groove is separate from, but connected with, the lubricant well.

Other Walworth Lubricated Plug Valves include Single Gland and Regular Gland types. Sizes to 30 inches. Pressures to 5000 psi. and for vacuum service.

Cutaway of a 24-inch Walworth Lubricated Plug Valve

Without exception, a Walworth Ball Bearing Lubricated Plug Valve is easier to operate and maintain than any other type of rotary-action, sealed valve available today for pipeline service. Design features pointed out here show just a few advantages of Walworth Ball Bearing Lubricated Plug Valves.

Many pipeline companies throughout the world use Walworth valves for handling gas, crude, and finished products. Investigate the line of Walworth valves for your own needs. See your Walworth Distributor, or write for literature: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

Use pigs or scrapers?

Walworth Type 49 Cast Steel Gate Valves are designed on the throughport principle to permit passage of pigs and scrapers — may be installed without regard to flow direction. Sizes 2 to 30 inches inclusive. Ask for literature.

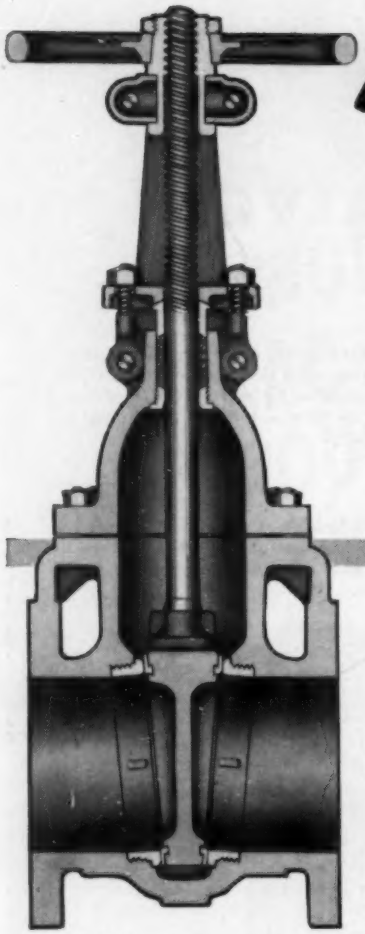
WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



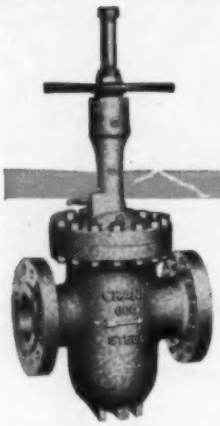
If You Want Exceptional Valve Service

STANDARDIZE ON CRANE

When a man finds equipment that is completely serviceable and economical to maintain, he usually talks about it voluntarily. That's the way it is with pipeline men and Crane valves. Whether you talk to the valve buyer or the man with the wrench, chances are he will tell you—*if you want exceptional valve service, standardize on Crane.*

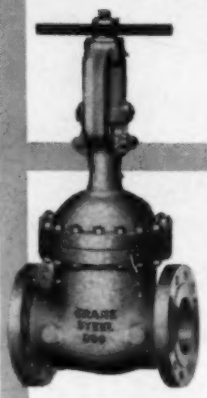
CRANE IRON BODY WEDGE GATES

Top-quality 125-pound gate valve with better all-round adaptability for many services. There's greater strength in the oval-shaped body and bonnet with extra metal where it's needed most. Flanged patterns have tie-ribs between body and bonnet flanges. Crane design also includes a solid web-type disc with long guides . . . a stem of liberal diameter with long thread engagement . . . a deep stuffing box with high-grade packing . . . a two-piece ball-type gland and flange—plus an easy-to-grip handwheel with oval-shaped rim. OS&Y and non-rising stem patterns, brass trimmed or all-iron. Screwed, flanged and hub end valves available. Sizes up to 48 inch.



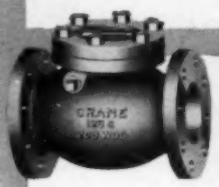
CRANE CLASS 600 GATES

Even infrequent operation won't affect their efficiency, for all working parts are sealed in grease. Dual-seating double disc is fully seated in open as well as closed position, thereby solving erosion problems. Conduit-type disc ports coincide exactly with seat openings for smooth, unobstructed flow with minimum pressure drop. Full-way or Venturi patterns for working pressures up to 1440 pounds, oil or gas. Sizes 2 to 30 inch; flanged or welding ends.



CRANE STEEL 300-, 400-, 600-POUND WEDGE GATES

Famous throughout the industry for their lasting service. The steel valve with the superior *Exelloy* trim that resists corrosion, erosion and wear. You'll like the smooth operation, the tight seating—the minimum maintenance. Available in a wide range of sizes with flanged or welding ends.



CRANE IRON BODY SWING CHECKS

Well-proportioned, sturdy valves, globular shaped to provide ample flow. *Disc cannot stick in open position.* All-iron valves have integral seating surfaces. Brass-trimmed valves have screwed-in body seat ring. All sizes have hinge suspended in the body. Easily adapted for outside lever and weight. Sizes up to 24 inch.

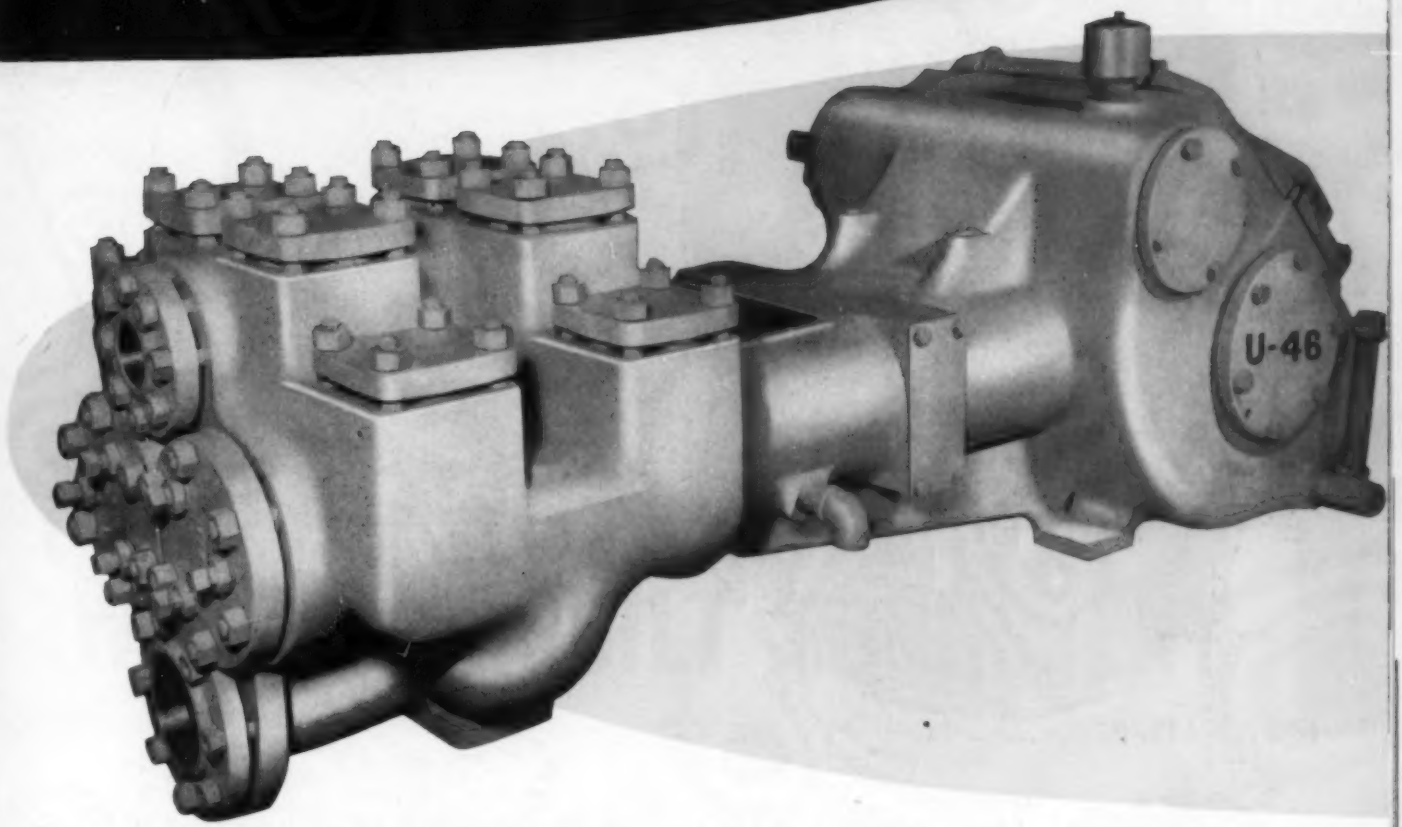
THE BETTER QUALITY... BIGGER VALUE LINE... IN BRASS, STEEL, IRON

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

You've Never Seen Such a Versatile Pump!



Bethlehem's U-46 is a small pump, but what a busy one! It's intended for general utility work, and we think it's the most versatile unit ever offered for this service.

The U-46 is a horizontal, duplex, double-acting pump with 4-in. maximum liner bore and 6-in. stroke. When used for conventional jobs, such as fresh-water pumping around the rig, it is furnished with alloy cast-iron liners. For handling salt water and other corrosive fluids, bronze liners, piston rods, valves, and valve seats are furnished. All-aluminum-bronze fluid end and accessories are also available. Moreover, fluid-end parts of correct materials can be supplied for oil and drilling-fluid service.

You'll find that your Bethlehem U-46 will seldom be idle. It is as much at home around the lease on gathering work as it is on the rig. This is a handy little unit that fits in anywhere, without fuss or bother. It's so easy to move that setting it up in a new location is never a problem.

The U-46 can be used with any type of prime mover—electric motor, gas or gasoline engine, etc. For further details and specifications, check with the nearest Bethlehem Supply office or store.

In addition to drilling-rig equipment and a full range of pumping units, Bethlehem offers Beth-Co-Weld line pipe, Purple Strand wire rope, and a complete variety of sucker rods, fasteners, etc. Ask for these products when you are next equipping your oil-country installations.

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
Export Distributor: Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

BETHLEHEM STEEL

keep your business on top

Expert financial counsel is a must
for the successful continuation of a business.
At The National Bank of Commerce officers actually work for each of our
industrial depositors, using their accumulated, specialized
financial experience to help you. This expert guidance is at your service when
you make The National Bank of Commerce the bank for your company.
So, keep your business riding smoothly by taking advantage
of the broad experience of The National Bank of Commerce of Houston.

THE NATIONAL BANK OF COMMERCE

OF HOUSTON

Gulf Building, Houston, Texas "The Bank for All the People"

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

WITH CAT-BUILT EQUIPMENT

This Cat* D6 Tractor with No. 6A Bulldozer and Hyster winch is one of 34 rugged yellow units used on a 164-mile section of 30-inch line for the El Paso Natural Gas Co. Contractor doing the job is Western Pipeline Constructors, Inc., Austin, Texas. Here the D6 backfills a stretch between Ashfork and Williams, Arizona. General Superintendent W. B. Williams says: "Caterpillar-built machines are the heart of our pipeline construction equipment."

Like all equipment built by Caterpillar, the D6 with angling bulldozer is built to do *more* work at *lower* cost with *less* down time than any unit in its class. Power, weight and traction are *matched* for *maximum* bulldozer production. Notice the *rolling* action of the blade, which is reinforced to handle heaping loads and has reversible cutting edges of high-carbon steel for longer wear. Notice operator visibility, too—a clear view that, along with ease of handling, speeds up work. There's easy changing of blade positions, also—a one-man operation to angle 25° left or right. These are just a few of many details that add up to money-making performance in typical, tough pipeline terrain.

Standardizing on Caterpillar-built equipment pays off many ways. For example, many parts are interchangeable. Operator and mechanic familiarity with one make means bigger production and less time spent on maintenance. And there's a big saving on one-stop service from your Caterpillar Dealer, who has the organization and stock of genuine parts to provide fast service *whenever* and *wherever* you need it.

The D6, like the D7 and D8, now comes equipped with a new oil-type flywheel clutch. On-the-job records show that this clutch provides much longer periods between adjustment and replacement than is possible with the conventional dry clutch. Get the facts about this money-making machine from your Caterpillar Dealer. Ask for a demonstration on your job!

Caterpillar Tractor Co., Peoria, Ill., U.S.A.

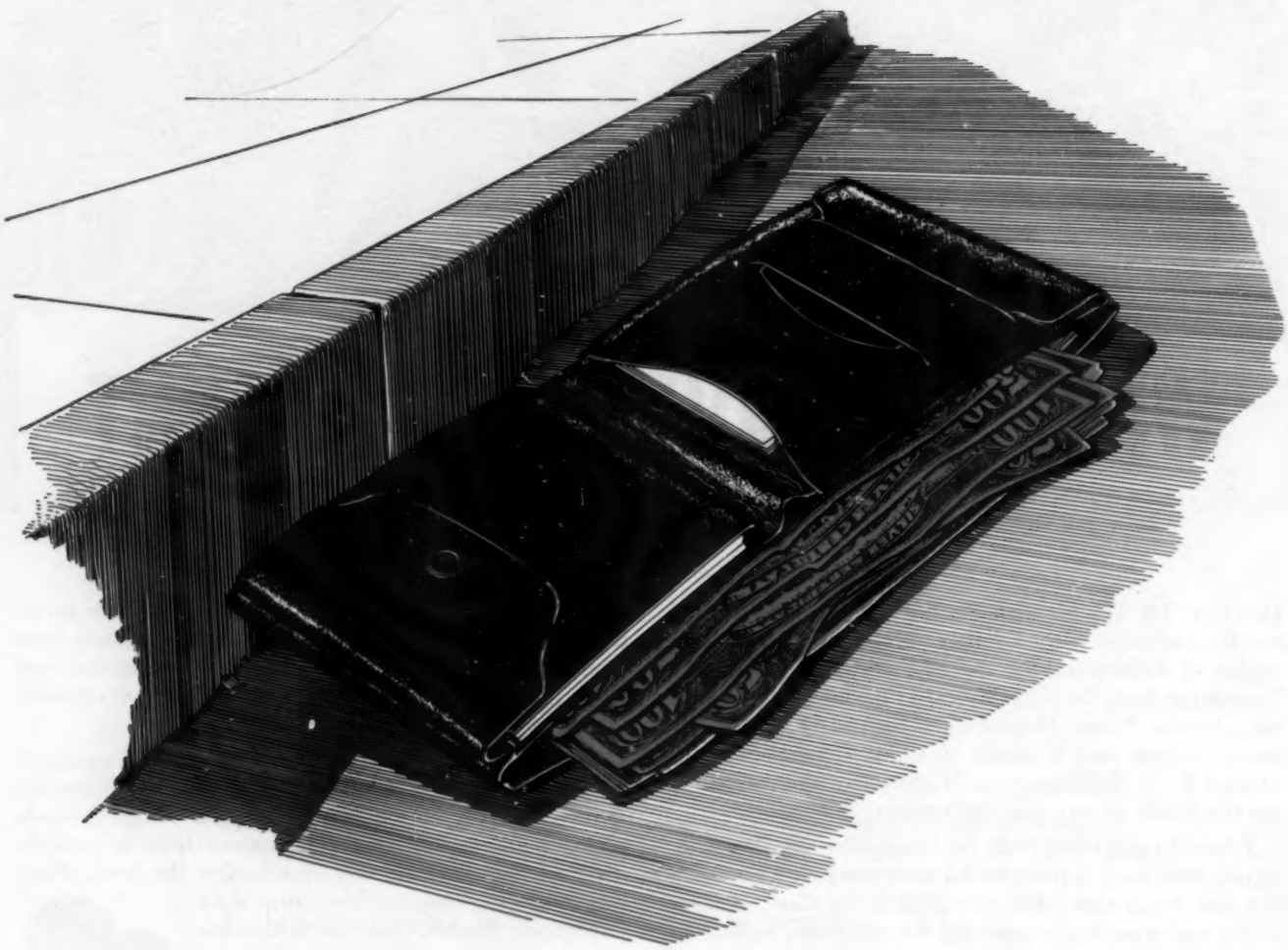
CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

KEEP ON SCHEDULE WITH CAT EQUIPMENT

1954

Like finding $5775 on the street!



. . . that's what the

FREE SCAVENGING

of each Clark Turbocharged Compressor can save you annually in fuel alone

$5775 a year? Sounds like a lot of money to save on fuel for *every compressor you install* . . . but it's a fact!

Based on 20¢ fuel, a Clark Turbocharged Model TLA-10 Gas-Engine-Driven Compressor, rated at 3300 bhp, will save you $5775 per year compared to a high-compression, non-turbocharged, conventionally scavenged unit. Other Clark Turbocharged Compressors show comparable savings.

How are such large savings possible? With Clark Turbocharged Compressors, there is *no need* to drain power from the engine crankshaft for pumping scavenging air. Instead, the Clark Turbocharger uses "waste" exhaust gases to pump scavenging air free of charge. The resulting savings in fuel are enhanced even more by the high thermal efficiency of these new turbocharged units.

Free scavenging is only one of the many ways that Clark Turbocharged Compressors will save you money. Ask any Clark representative to prove it to you. Bulletin 134 provides valuable details. Write.

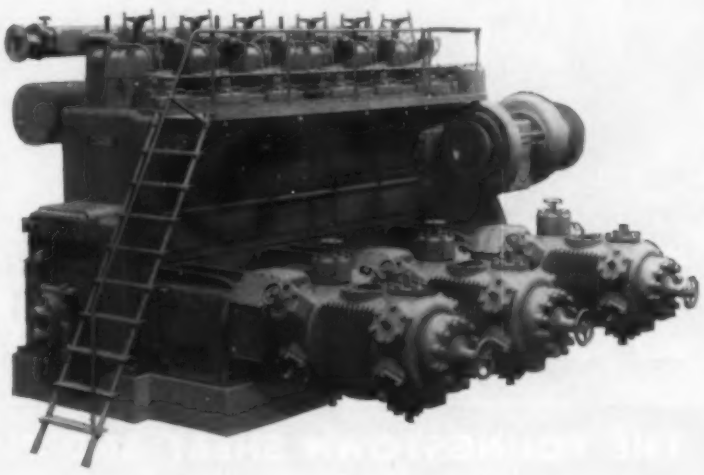
CLARK BROS. CO. • OLEAN, N. Y.

ONE OF THE DRESSER INDUSTRIES

Sales Offices in Principal Cities Throughout the World

CLARK®

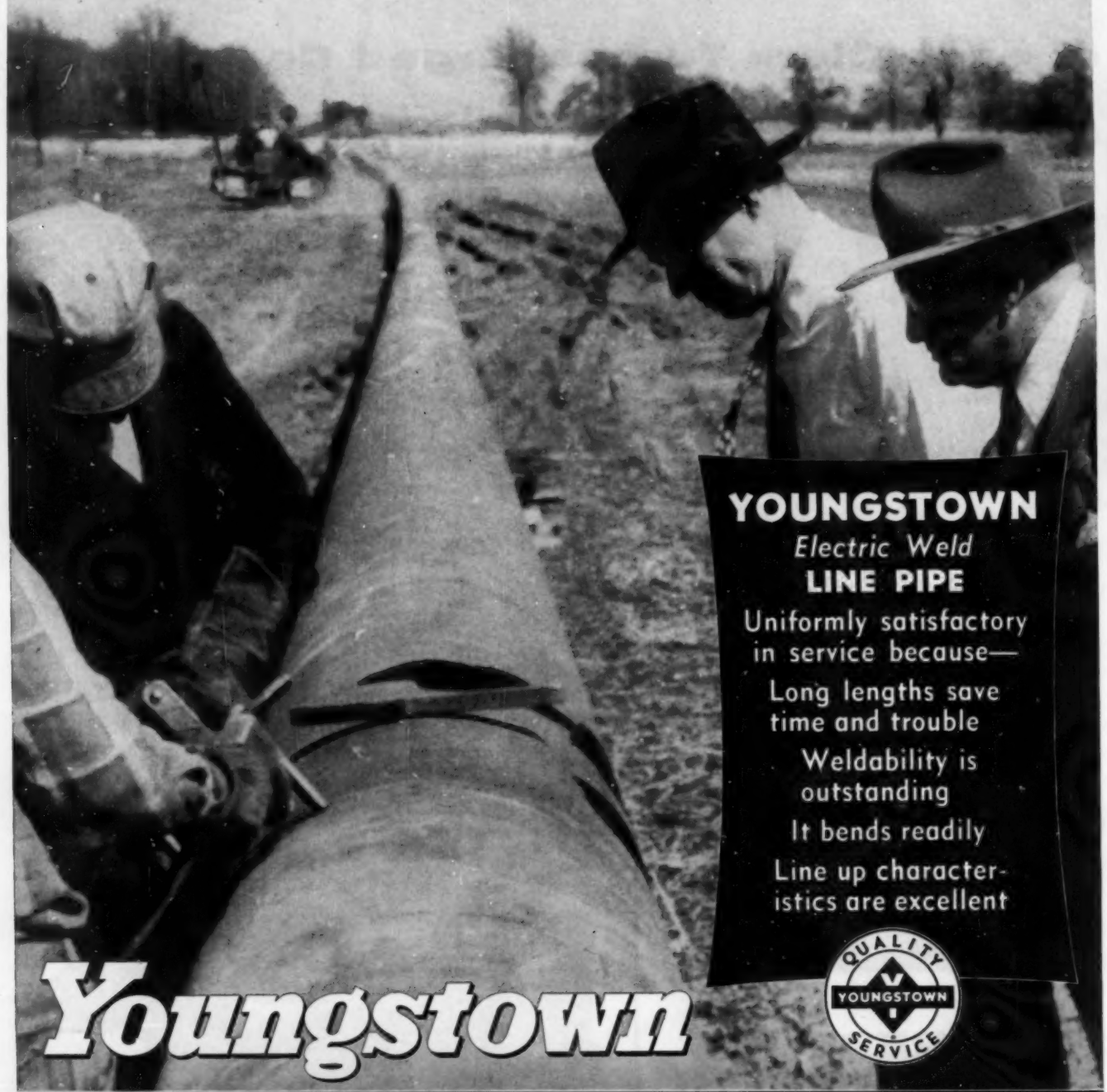
COMPRESSORS



Clark sets the pace in compressor progress

Yes, it's Youngstown

THE EXCELLENT WELDING QUALITIES of Youngstown line pipe are evident on every job. Pipe line contractors who are becoming increasingly critical of pipe features which add to their costs welcome this easy-to-weld pipe.

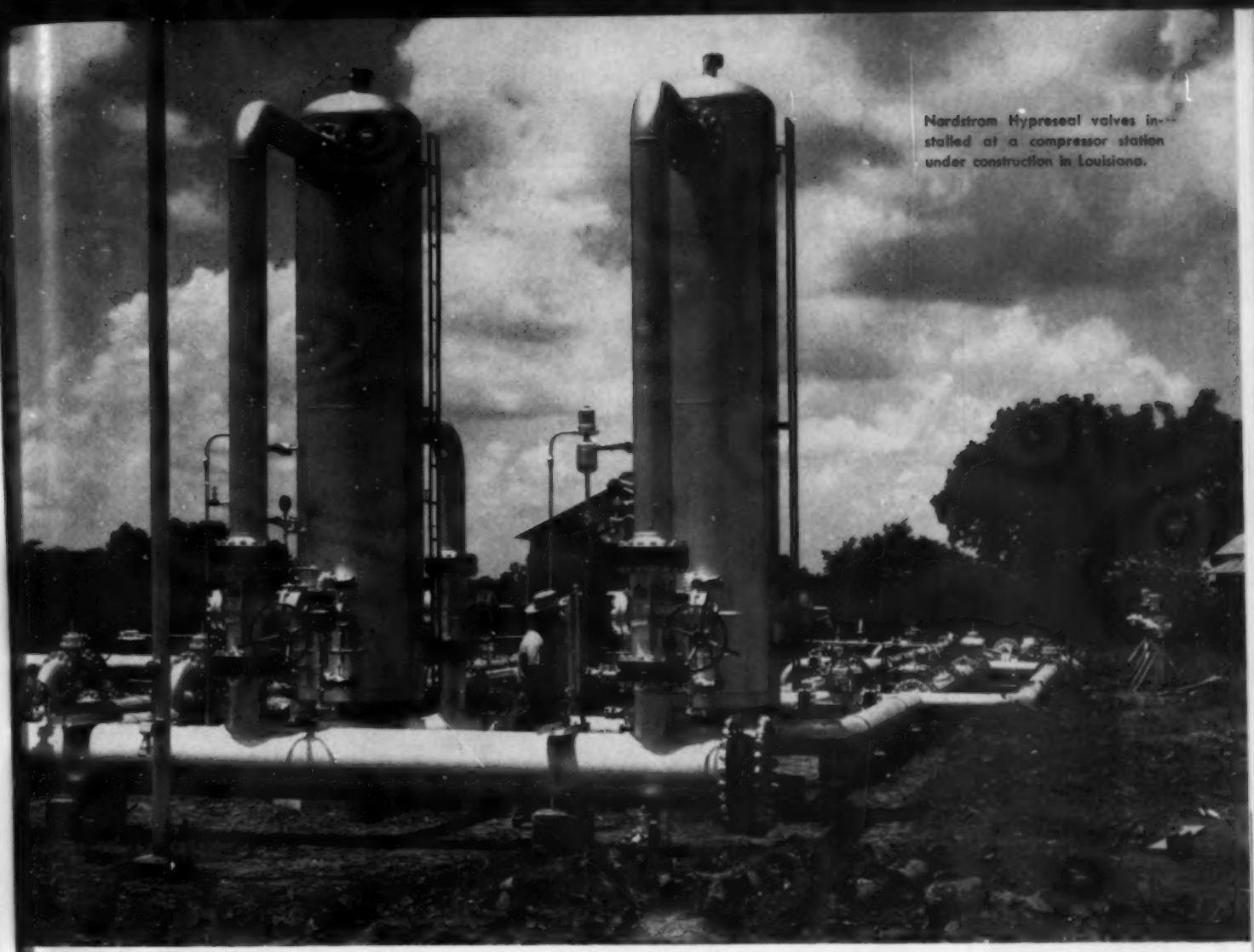


YOUNGSTOWN
Electric Weld
LINE PIPE
Uniformly satisfactory in service because—
Long lengths save time and trouble
Weldability is outstanding
It bends readily
Line up characteristics are excellent

QUALITY YOUNGSTOWN SERVICE

Youngstown

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices: Youngstown, Ohio - Export Office: 500 Fifth Avenue, New York 36, N. Y.
PIPE AND TUBULAR PRODUCTS - CONDUIT - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS - SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES



Nordstrom Hypreseal valves installed at a compressor station under construction in Louisiana.

ELIMINATE VALVE PROBLEMS

—Before They Begin . . .

. . . Install Nordstroms While Your Station is Under Construction

There won't be any valve problems at this pipe line compressor station—they're installing Nordstrom *Lubricant-Sealed* valves.

More and more, Nordstroms are being installed on all types of pipe line services because of the many advantages inherent in the Nordstrom system of lubrication.

Nordstroms seal more tightly because a film of *lubricant* surrounds seat ports preventing leakage . . .

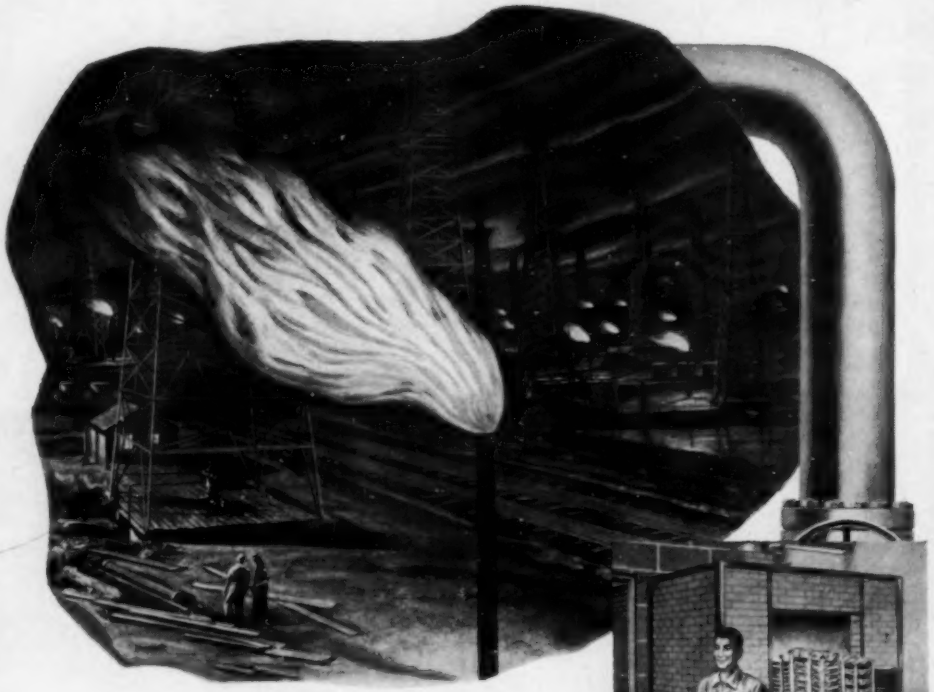
They operate more easily because *lubricant* keeps the plug ready to slide smoothly within the body . . .

They last longer because *lubricant* prevents abrasion from wearing away the seating surfaces . . .

All of these advantages in one valve make Nordstroms first choice for pipe line services. Rockwell Manufacturing Company, Pittsburgh 8, Pennsylvania.

ROCKWELL Built
Nordstrom Valves
Lubricant-Sealed for Positive Shut-Off

Another Product



In ceramics and many other industries requiring precise heat control, the use of dependable, low-cost natural gas is steadily growing.

YESTERDAY'S WASTE... TODAY'S WEALTH

Natural gas . . . Nature's miracle fuel. Once burned in the field as an unwanted by-product of oil or left unused underground.

Today, Tennessee Gas turns this great natural resource into wealth. Puts it to work by piping it from the Southwest to the tremendous fuel-hungry markets of the East.

This great pipeline buried below the reach of storms, immune to traffic delays, delivers a billion-and-a-half cubic feet of gas a day. Assures both home and industry a dependable, day-to-day, round-the-clock supply of the world's most efficient fuel.

Better heat, better living for millions!

Clean, convenient, even-burning. Natural gas—ideal for cooking, home heating. Now available to millions who could not be supplied before.

TENNESSEE GAS
TRANSMISSION COMPANY
HOUSTON, TEXAS
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

One of a series of advertisements appearing in full color in national publications.

SO ALL MAY KNOW!

We in the natural gas industry know about the industry's meteoric growth . . . its gigantic scope . . . its many contributions to the American economy. But the TENNESSEE GAS Transmission Company believes that producer, pipeline, distributor and consumer will benefit if the public is told how natural gas helps them and the nation more every day. Advertisements like this are designed to do that job.

TENNESSEE GAS TRANSMISSION COMPANY
HOUSTON, TEXAS

ARE CLOGGED LINES LIKE THESE CUTTING YOUR WATER SUPPLY?

Over 1½ Miles of Buried Water Line Chemically Cleaned IN PLACE by Dowell Service

You don't have to dig up water lines in order to clean them! Take the case of a major railroad that had over 8600 feet of *buried* water lines, ranging from 2 to 12 inches in diameter. The capacity of these lines had been greatly reduced by scale deposits. Dowell Service used liquid solvents to clean all the lines, *in place*, during a period of only six days with a minimum interruption in service.

Dowell Service offers *fast*, effective chemical cleaning of pipelines of all kinds—water lines, disposal lines and product lines. And, whether these lines are underground or above, indoors or out, no digging or dismantling is necessary. Dowell solvents are designed to dissolve the accumulated deposits, and are introduced through regular connections. Because they are liquid, Dowell solvents reach wherever steam or water can flow, cleaning places inaccessible by other methods—angles, curves, valves, complicated surfaces and hook-ups. *Experienced* Dowell engineers do the job using Dowell-designed truck-mounted pumps, mixers and control equipment.

Many other types of equipment can also be cleaned chemically by Dowell. If you have boilers, condensers, evaporators, bubble towers, water wells or other operating equipment where deposits are reducing capacity, let Dowell Service *save you time and money in maintenance cleaning!*

FIND OUT ABOUT CHEMICAL CLEANING! There are many places in your plant where Dowell Service can clean equipment faster and better than out-dated mechanical methods. Call your nearest Dowell office for a fact-filled book. Or write direct to Tulsa, Dept L-59.

DOWELL SERVICE

Over 100 Offices to Serve You with Chemical Cleaning for:

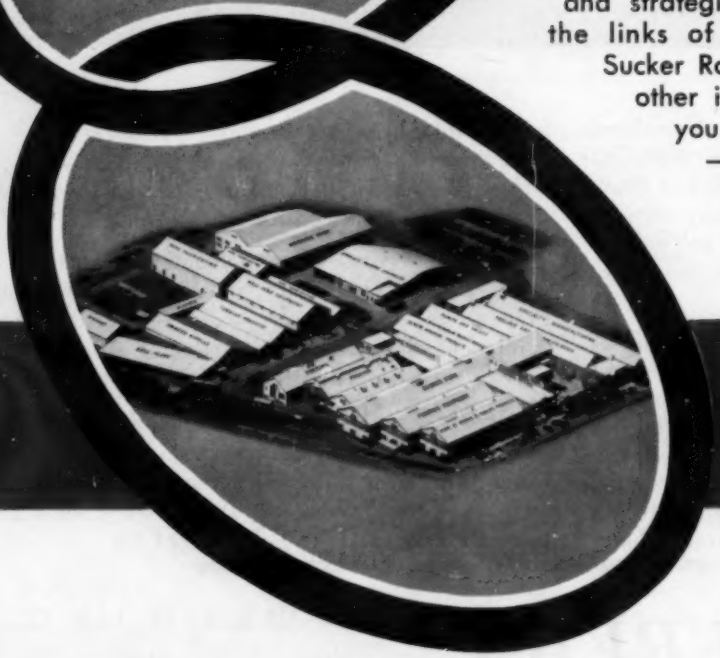
Boilers • Condensers • Heat Exchangers • Cooling Systems
Pipe Lines • Piping Systems • Gas Washers • Process Towers
Process Equipment • Evaporators • Filter Beds • Tanks

Chemical Services for Oil, Gas and Water Wells

DOWELL INCORPORATED
Tulsa 1, Oklahoma

DOWELL

A Service Subsidiary of
THE DOW CHEMICAL COMPANY



the chain of DEMAND

Anchored to the reputation, facilities and service of Norris.

For over 70 years, W. C. Norris has worked to make this chain stronger—by developing improved materials and manufacturing processes to give you quality oilfield products.

Branch warehouses are heavily stocked and strategically located to strengthen the links of this chain. Whether it's Sucker Rods, Fittings, Well Heads, or other items of pumping equipment you need — DEMAND NORRIS — the dependable link in your buying.

Your SUPPLY STORE IS OUR DISTRIBUTOR

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

WEST COAST DISTRIBUTORS:
Swaged Nipples and Bull Plugs
REPUBLIC SUPPLY COMPANY OF CALIFORNIA, Los Angeles
Norris Sucker Rods
HICKEY PIPE & SUPPLY COMPANY, Los Angeles

Since 1882

BRANCHES:
GREAT BEND, KANSAS; HOUSTON, KILGORE, ODESSA, TEXAS; SALEM, ILLINOIS; CASPER, WYOMING
EXPORT: 30 ROCKEFELLER PLAZA, NEW YORK CITY

He helps teachers in 54,000 classrooms

Radio was barely out of the earphone stage 26 years ago when a new program was beamed from a San Francisco studio. It featured a string trio and was based on the idea that good music, when clearly understood, could entertain and teach, too. Actually, only 72 Western schools had radio sets then, but with that performance the Standard School Broadcast was "on the air."

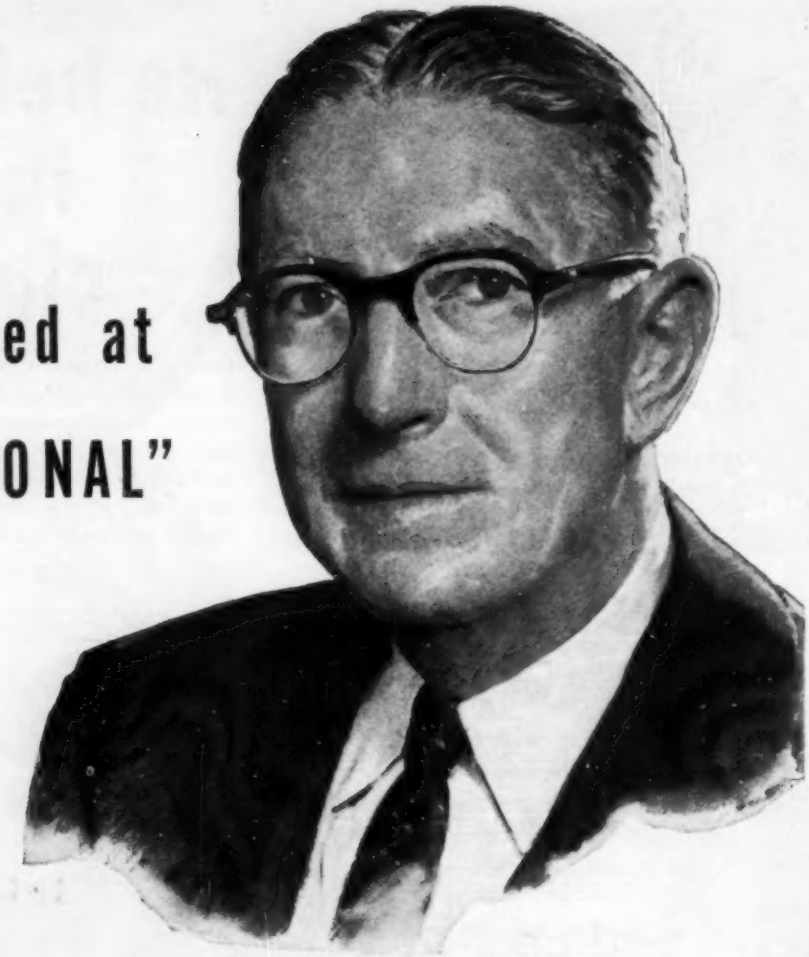
Today, when Conductor Carmen Dragon lifts his baton, it's "time for the Standard School Broadcast" in over 54,000 classrooms through the West, Alaska and Hawaii. Counting children, teachers and home listeners, the program reaches a weekly audience of nearly 1½ million. That string trio has grown to a symphonic orchestra with a dramatic cast, choral group and guest vocal and instrumental artists. Selections range the musical alphabet from symphony to jazz. Each year's course follows a carefully planned outline published in a manual supplied to teachers by Standard to serve as a guide in blending music-enjoyment with subjects like art, literature, social studies. Now in its 27th year, the Standard School Broadcast is radio's oldest education program, heard today over more than 100 stations. Its goal is to help Western children gain an absorbing new interest in the world's good music, and —through music—a broader knowledge and understanding of the world around them.

Listen to the Standard School Broadcast every Thursday. Check your newspaper radio log for the time and station.

STANDARD OIL COMPANY OF CALIFORNIA

75 years of planning ahead to serve you better

"We're Oil Minded at SECOND NATIONAL"



"With a separate Oil and Gas Department, staffed by petroleum engineers and geologists, Second National has developed a complete service for oil and gas men and firms.

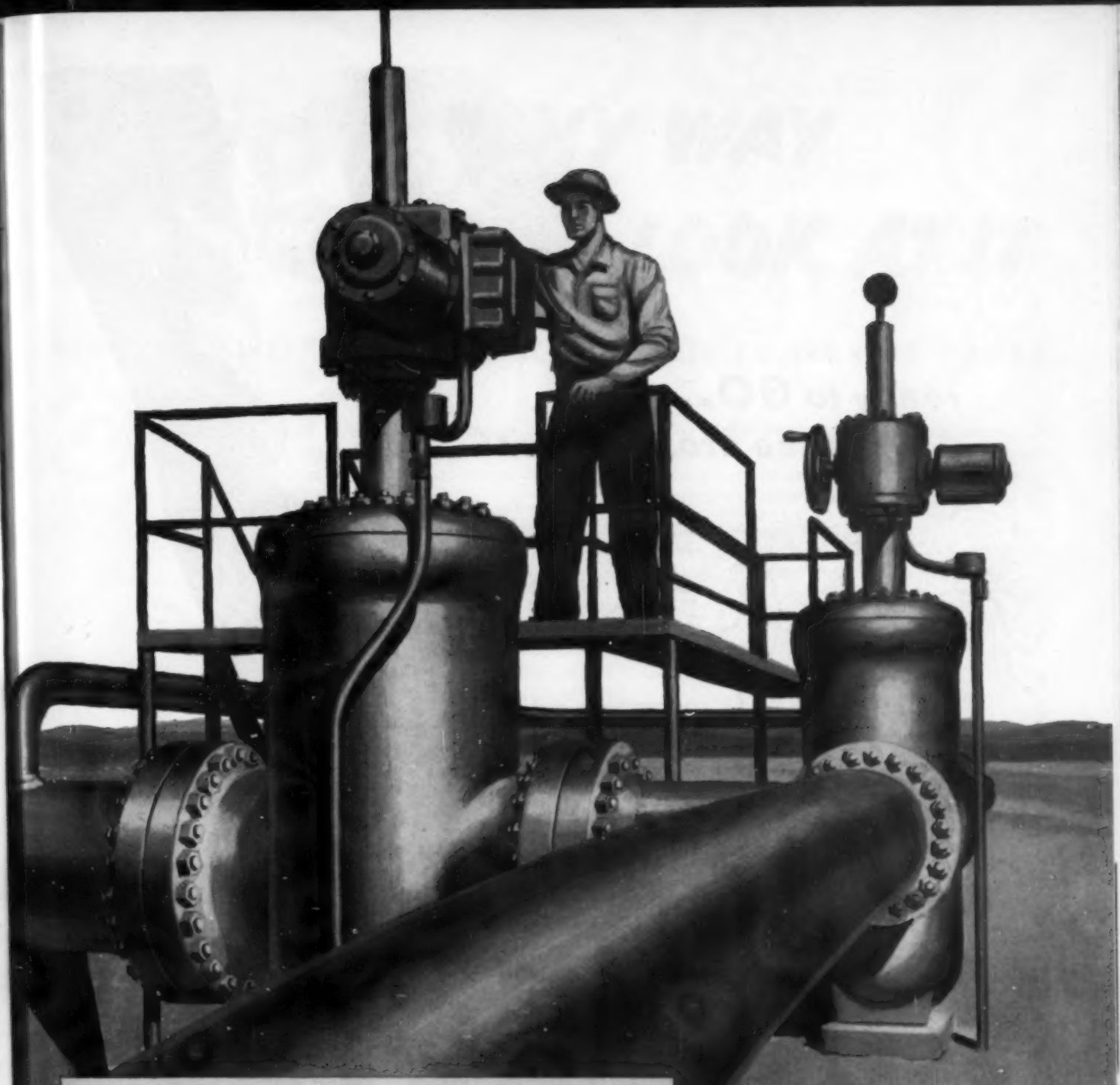
"Our genuine desire to be of help in discussing our customer's plans and problems has made Second National one of the nation's leading oil banks. We subscribe to oil and gas reports, journals, reports on wells drilled, and maintain all of the latest up-to-the-minute statistical files on oil and gas operations. We keep all of this material available for our customers.

"To learn more about how we can be of valuable service to you, come in and visit our Oil and Gas Department. Let us show you how our Collection Department and Mail Deposit Department can save you time and money—we'll welcome the opportunity to get acquainted with you."

47 Years of Service to the Southwest

SECOND NATIONAL
Bank of Houston

CAPITAL AND SURPLUS 20 MILLION DOLLARS
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



Most of the world's most modern pipelines are tied together with

W-K-M VALVES

W-K-M MANUFACTURING COMPANY, INC.

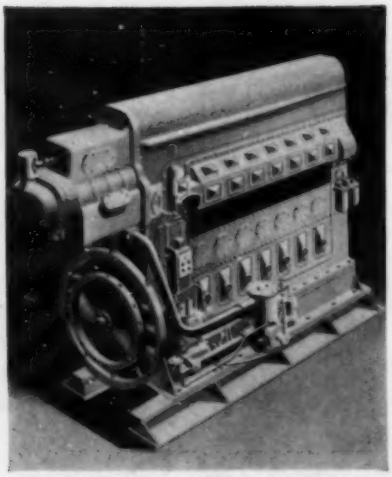
A SUBSIDIARY OF A.C.F. INDUSTRIES INCORPORATED

P. O. Box 2117 Houston 1, Texas

Los Angeles, Calif.

Export Office: 30 Rockefeller Plaza, New York, N. Y.

W-K-M Valves



Fairbanks-Morse Model 38F 90—320 to 825 hp.

Here's fast-starting power for oil line pumping that doesn't quit till you say "whoa"... the Opposed-Piston Fairbanks-Morse Model 38F 90 diesel. Because the engine is delivered with all controls and accessories in place, you need only attach fuel and water lines and it's ready to go.

And fewer moving parts (40% less than you find in conventional diesels) are responsible for the O-P's low starting inertia and high availability, as well as making it the easiest engine to operate and maintain.

Equally important, the 38F is 20% smaller and lighter than any other engine in its horsepower range, to give you more heavy-duty power in less space. It has three-way fuel options, so that you can choose diesel, dual fuel or spark-ignited gas... whichever is the most economical in your locality.

For full information about the many advantages of Model 38F 90's, see your nearby Fairbanks-Morse Oil Field Specialist, or write to Fairbanks, Morse & Co., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL & GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

big...ANY WAY YOU LOOK AT IT

BIG IN CAPACITY. BIG IN EFFICIENCY. BIG IN EARNING POWER.

Undisputed load-carrying champions, only these Macks deliver so many specific working advantages to oilfield equipment haulers.

A fast trip from site to site is assured by the high maneuverability of Mack chassis design and the easy control of power-steering.

All-weather operation regardless of terrain because Mack six-wheelers have the famous Balanced Bogie that won't bog down. Only Mack offers the exclusive Power Divider which distributes torque between bogie axles in proportion to traction, pulls through where ordinary trucks mire in.

Safety plus real driver satisfaction with masterful air-actuated brakes and easy-to-operate air-assist clutch.

The right powerplant to haul most efficiently, most profitably for each specific operation, provided by a complete range of engine options up to 300 horsepower.

The right transmissions permit high speeds when running light, provide extremely low speed ratios for winching operations.

WHEREVER YOU SEE A TOUGH JOB . . .
THERE IS WHERE YOU SEE MACKS

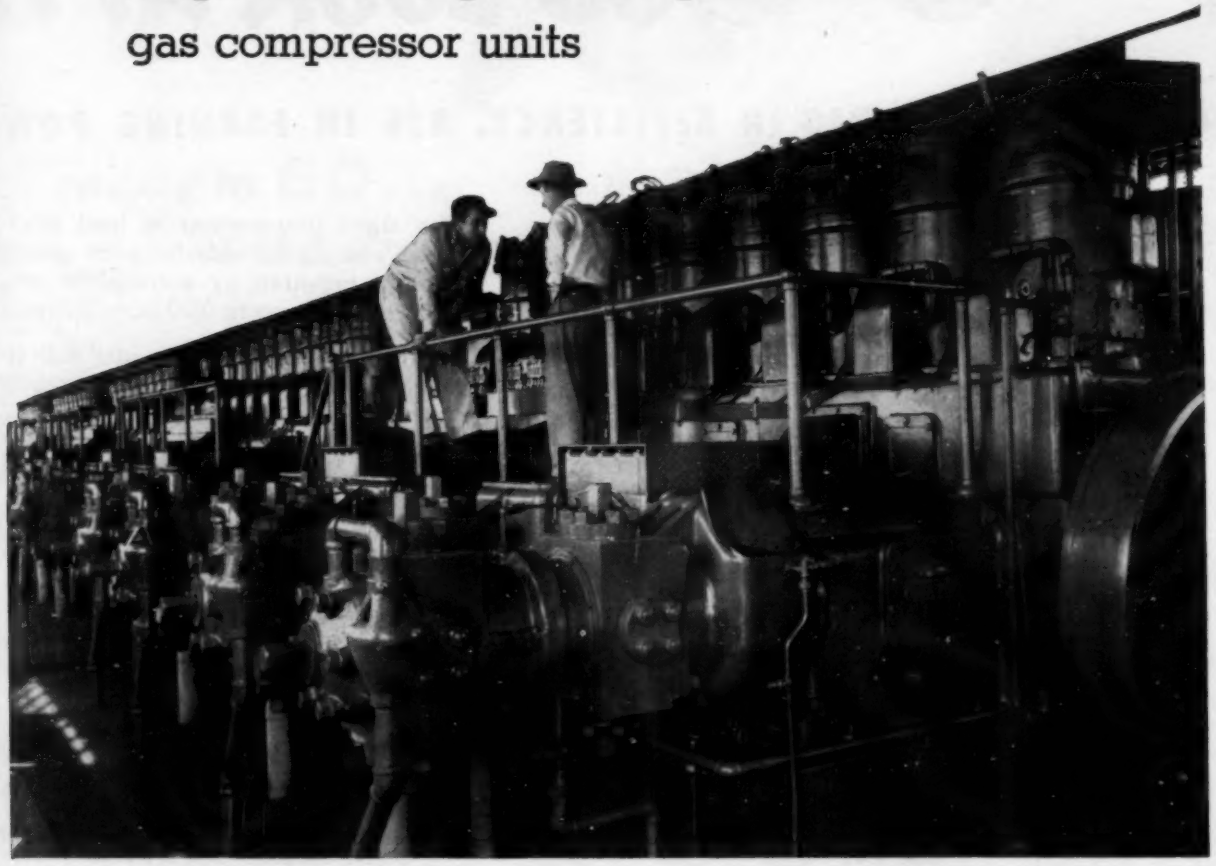
Mack TRUCKS

Mack Trucks, Empire State Bldg., N. Y. 1, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

2227

GULF SECURITY OIL

helps insure dependable performance of gas compressor units



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company

1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF INDUSTRIAL LUBRICATION

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

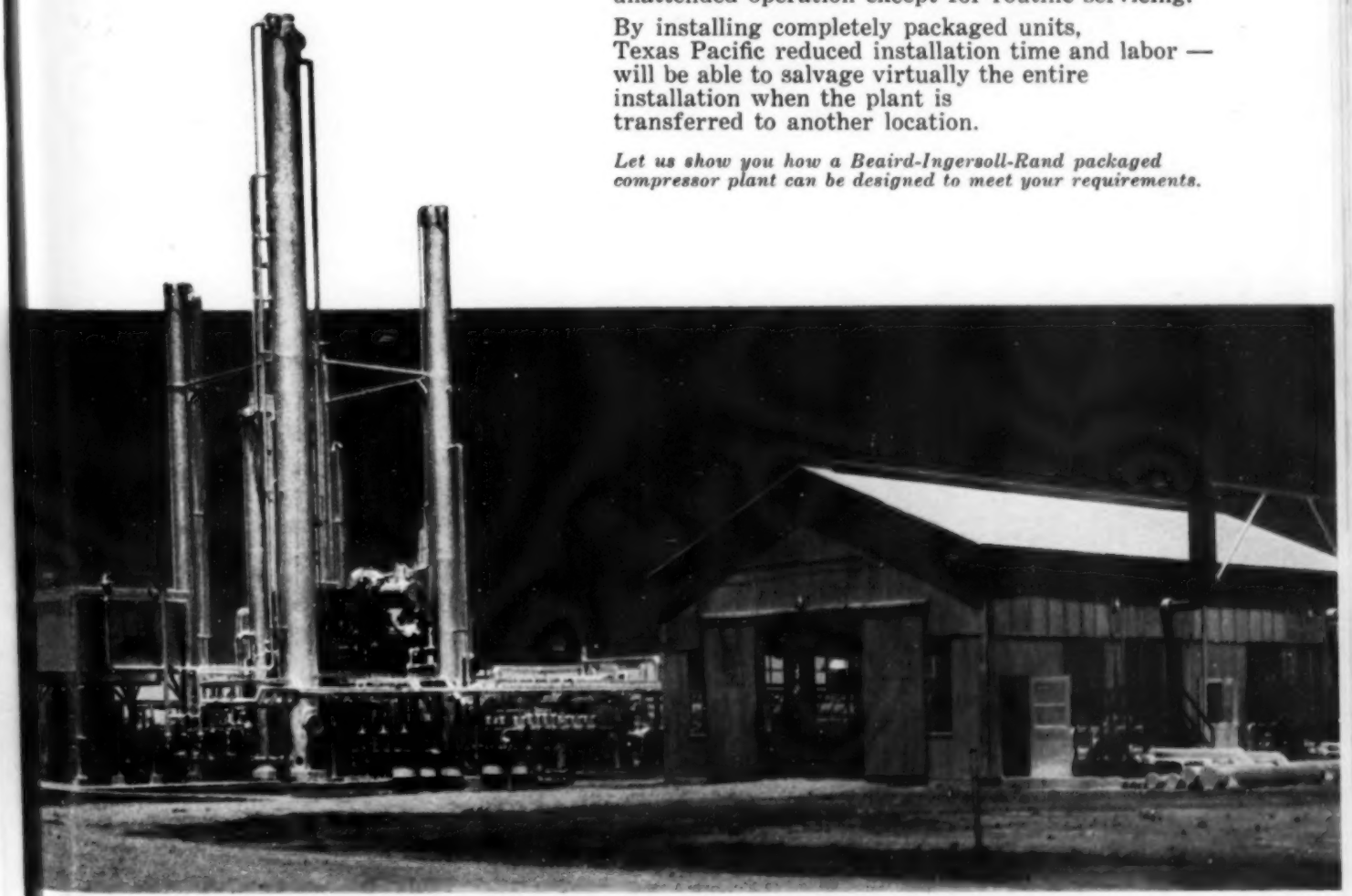
PACKAGED COMPRESSORS FOR GASOLINE PLANT

TEXAS PACIFIC COAL AND OIL COMPANY recently opened a compression-refrigeration type gasoline plant near Hamlin, Texas. The multiple compression tasks required in this process were entrusted to two 550 h.p. Beaird-Ingersoll-Rand packaged compressor plants. Each unit uses three stages to raise raw gas from 0 to 530 psig. The fourth cylinder compresses propane used as a refrigerant in the process. Plant vapors are collected and delivered into the sales line by a fifth cylinder added to one of the compressor plants.

To assure continuous operation, Texas Pacific installed two packaged units rather than one large compressor of equal horsepower. Plant pressures and operations can be maintained, when necessary, by one unit, while the other unit is shut down for maintenance or repair — with the loss of only a portion of the plant's total producing capacity. Automatic controls built into the units permit their unattended operation except for routine servicing.

By installing completely packaged units, Texas Pacific reduced installation time and labor — will be able to salvage virtually the entire installation when the plant is transferred to another location.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your requirements.

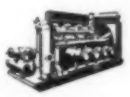


Texas Pacific Coal and Oil Company's packaged compressor plant, Velta Plant, Fisher County, Texas—equipped with two Beaird-Ingersoll-Rand 550 h.p. 10 SVG FOUR CYCLE gas engine driven compressors, Young radiators and all necessary equipment and controls. Other sizes 110 to 660 h.p.

THE J. B. BEAIRD COMPANY, INC.
Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE



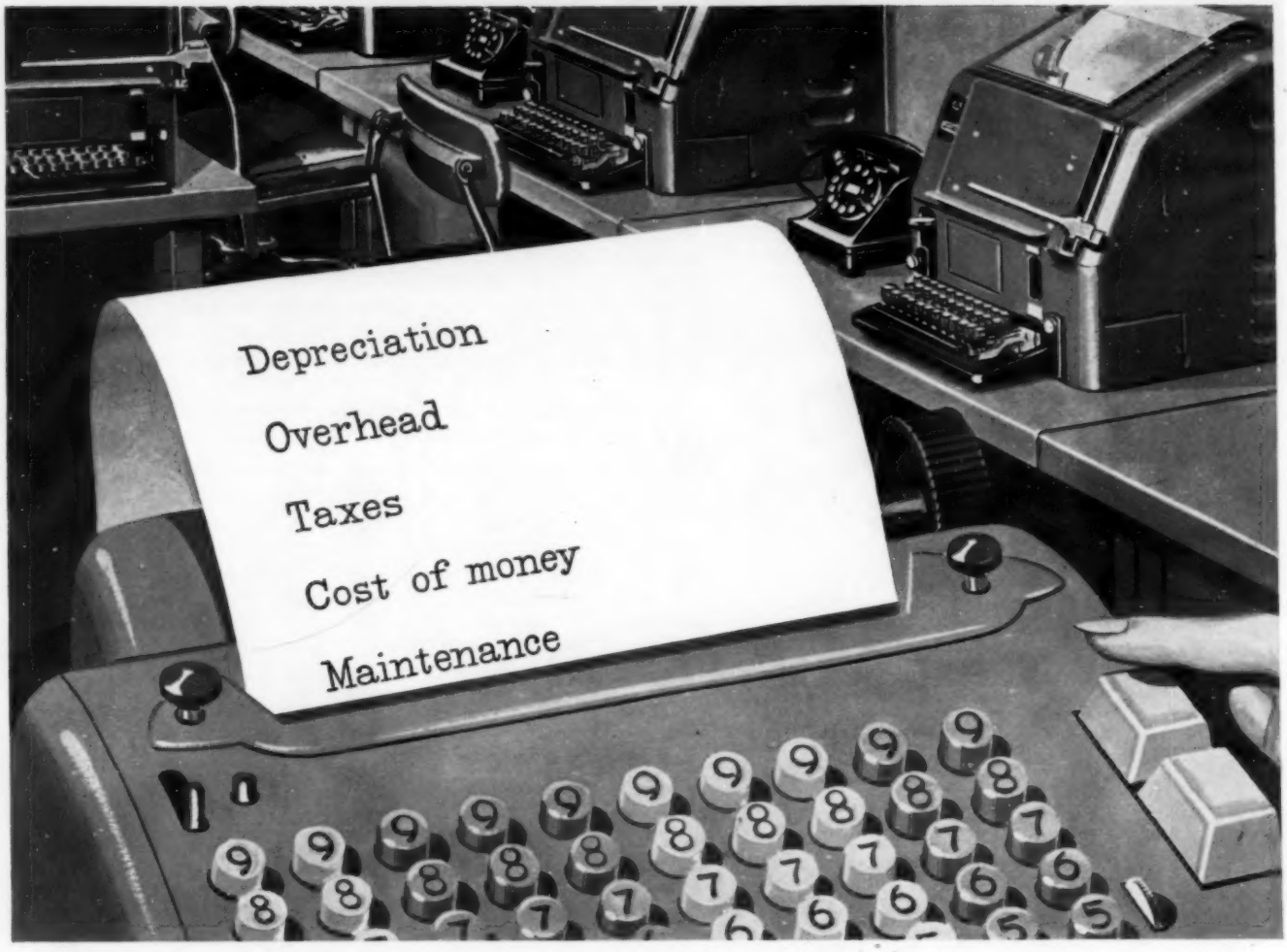
PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS



If you provide your own communications system...

HAVE YOU ADDED UP ALL THESE COSTS?

Owning and operating your communications system can be a costly experience, with many costs frequently overlooked. Depreciation, taxes, overhead, maintenance, loss of interest on capital all contribute to your total communication expense.

Bell System communications are low in cost. You pay only a fixed monthly charge for services tailored to your exact needs. No more, no less. Your capital is not tied up but left free for income-producing investments in *your* business.

Service has just begun when Bell System communications are installed. Maintenance, replacement, inventory, storage, extension and rearrangement of service are all handled rapidly and efficiently—no longer problems for you.

Let us show you how Bell System know-how and experience can be put to work to solve your communications problems. For a complete communications study, made without charge, call your local Bell Telephone representative today.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

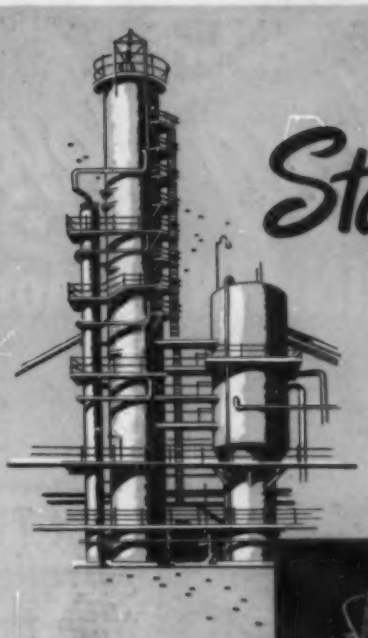
BELL TELEPHONE SYSTEM

WHO'S MEETING WHERE

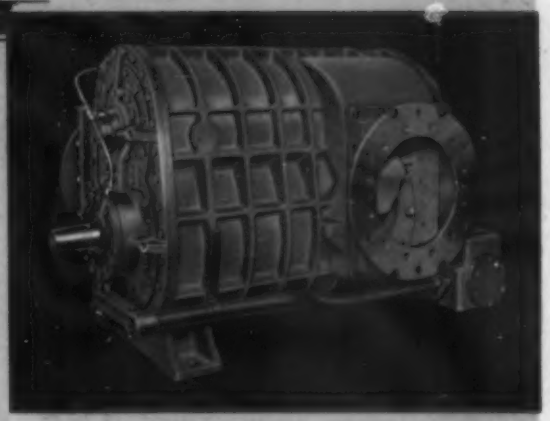
DEC.	
6- 7	SGA Advisory Council and Management Conference, Point Clear, Ala.
6- 8	AGA-EEI Electronics Seminar, Hotel Commodore, New York.
8-10	Eastern Computers Conference (AIEE, IRE, ACM), Bellevue-Stratford Hotel, Philadelphia.
12-15	American Institute of Chemical Engineers, Statler Hotel, New York.
1955 JAN.	
17-19	Annual Convention, Pipe Line Contractors Association, Statler Hotel, Los Angeles.
18	NEGA Operating Division, Hotel Statler, Boston.
21	SGA Employee Relations Roundtable, Nashville.
26-28	Instrumentation for the Process Industries Symposium, Texas A&M College, College Station, Texas.
27-28	American Chemical Society, Symposium on Hydrocarbon Chemistry, Rice Hotel, Houston.
FEB.	
13-17	American Institute of Mining and Metallurgical Engineers, Conrad Hilton Hotel, Chicago.
13-18	A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston.
16-18	National Association of Corrosion Engineers, Sixth Annual Short Course for Pipeliners, Mayo Hotel, Tulsa.
25	National Gasoline Association of America, Permian Basin Regional Meeting, Scharbauer Hotel, Midland, Texas.
MAR.	
4	Southern Gas Association, Transmission Management Conference, Shamrock Hotel, Houston.
7- 9	Mid-West Gas Association, St. Paul Hotel, St. Paul, Minn.
7-11	National Association of Corrosion Engineers, Palmer House, Chicago.
24-25	American Gas Association, Gas Supply, Transmission and Storage Conference, Wm. Penn Hotel, Pittsburgh.
24-25	NEGA Annual Meeting, Hotel Statler, Boston.

Use the Readers' Service Cards in this Issue

For more information on the advertised products in this issue, make use of the post card just inside the back cover. Circle on the post card the code number of the item desired. Your request will be forwarded to the manufacturer and the material will be mailed directly to you. Use the post card also to obtain material on the new equipment and literature items reviewed in this issue by circling the editorial code numbers at the top of the post card.



Standardaire® Blowers



assure you of higher efficiency on a variety of refinery operations

The *Standardaire* Blower moves more gas or air . . . with less wear, maintenance and power cost than other blowers of equal weight and size.*

It does this by employing a proved principle of compressing gas or air on a modified adiabatic cycle, providing a wide range of pressures with a minimum of internal losses.

Highly precisioned rotors draw the air or gas in and discharge it smoothly and uniformly from the pockets which form between the rotors . . . resulting in a gradual compression, completely internal and free from shock.

Write today for further information.

READ STANDARD CORPORATION

BLOWER-STOKER DIVISION
370 Lexington Avenue
New York 17, New York

Read Standard also manufactures a complete line of chemical mixers for laboratory and industrial use. For information write, Read Standard Corp., York, Pa.

Something New Again
in the LUFKIN LINE – Model TOF (C)

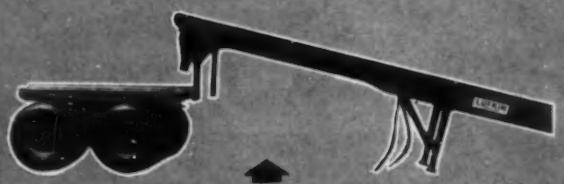
a combination self-loading float and pipe trailer ...

FOR OILFIELD, MACHINERY & HEAVY HAULING TRUCKERS

Get TWO (2) LUFKIN Trailers for little more than the price of ONE (1)

LUFKIN STANDARD MODEL TOF SHOWN WITH ALL OILFIELD SELF-LOADING FEATURES—READY TO BE USED FOR ANY HEAVY DUTY HAULING WHEN FLOAT IS REQUIRED. NOTE—LANDING GEAR FOLDS COMPLETELY UNDER TRAILER AND DOES NOT INTERFERE WITH LOADING OPERATION.

NOSE OF TRAILER IS TILTED FORWARD—BALANCED ON LANDING GEAR—4 PINS ARE REMOVED AND RUNNING GEAR EASILY PULLED BACK BY 1 MAN.



PIPE TRAILER IS COMPLETELY DETACHED FROM FLOAT BED AND READY FOR BOLSTERS, COUPLING POLES, ETC., FOR PIPE HAULING OPERATION.

BOLSTERS AND POLES INSTALLED ON PIPE TRAILER IN A FEW MINUTES.

NOTE: FOUR (4) STEPS ARE REVERSED IN SHORT ORDER TO RE-CONVERT TO FLOAT TRAILER.

HERE ARE THE ADVANTAGES OF THE LUFKIN MODEL TOF (C)

1. **IT'S SAFE—IT'S CONVENIENT**
2. **IT'S CHEAPER—TWO (2) TRAILERS FOR PRACTICALLY THE PRICE OF ONE (1)**
3. **IT'S AVAILABLE—AS A FLOAT OR PIPE HAULER—(2 MEN CAN MAKE CHANGE-OVER IN APPROXIMATELY 30 MINUTES**
4. **ONLY EIGHT (8) TIRES ARE PURCHASED AND MAINTAINED AS AGAINST SIXTEEN (16) WHEN 2 COMPLETE TRAILERS ARE PURCHASED.**
5. **ONLY ONE INSURANCE POLICY IS REQUIRED—IT'S STILL CHEAPER.**
6. **ONLY ONE (1) LICENSE PLATE IS REQUIRED—IT'S STILL CHEAPER.**

You can't GO WRONG with the LUFKIN TOF (C) if you want economy, less maintenance, lower cost and more service.

CALL YOUR NEAREST LUFKIN MAN FOR COMPLETE DETAILS

LUFKIN TRAILERS

DIVISION OF **LUFKIN FOUNDRY & MACHINE CO.**

FACTORY: LUFKIN, TEXAS • Phone 3-4425

BRANCHES AND SALES OFFICES { HOUSTON • DALLAS • ODESSA • SWEETWATER • WACO
CORPUS CHRISTI • SAN ANTONIO • LUBBOCK • SHREVEPORT

Show your pipe line system on a big, new three-dimensional map

Is there a place in your office or conference room for a handsome, executive size relief map of the United States, showing your pipe line system in full detail? A map that catches the eye and imagination?

THIS IS NO ORDINARY MAP—It's 64 x 40 inches. Printed in 11 colors, it has won national lithographic awards. This relief map is plastic—not paper, not plaster. It weighs only 2½ pounds, and it's as easy to hang as a picture. No framing problems or expense—the map has its own frame, formed in the same durable Vinylite as the map itself.

THE MOUNTAINS STAND OUT—The map lists over 1300 cities, towns, market centers, rivers and streams, national parks and monuments. It is formed under heat and pressure to show the land forms in clear relief. The mountains stand up sharply from the map, and you can see the valleys and drainage patterns in other areas. You know how big a part topography plays in pipe line routings, and how meaningful such a map could be in showing your system.

HOW DO YOU SHOW YOUR LINES?—We ship the basic flat map to you (before forming the relief). Your draftsmen, using conventional drafting pens and Craftint acetate inks, draft your lines on this map. You can show terminal points, service areas or any other special data to make your map especially useful to you.

RETURN THE MAP TO US—Your drafting department slides the map back into the carton and returns it to us. Our relief modellers carefully form your map, then apply a special plastic coating which protects the map's surface fully. You can mark on the map with a china marking crayon or grease pencil and wipe it off, with no damage or effect. The plastic coating seals the map inks away from air and moisture, too.

YOUR FORMED 3-D MAP ARRIVES—After forming, we return the map to you via Railway Express. It arrives ready for hanging in your own office, in the board of directors' room, or in the reception lobby. Some companies also use the map in their exhibits or displays. Others photograph it for use in annual reports or advertising. Wherever you hang it, you'll like the colorful, striking 3-D effect. Cost? Only $50.00.

ON APPROVAL? YES, IF YOU WISH—If you want a first-hand look at the map before you decide, we'll ship a flat map to you at our expense for your examination. Please understand that the unformed map cannot do justice to the three-dimensional effect, or to the interest gained by showing your own lines on the formed map. This unique map is the product of a worldwide mapping organization, and it is a responsible and accurate model.

Would you like to have this map on your wall? Then please fill in the coupon below and return it to us today, while you're thinking about it.

AERO SERVICE CORPORATION
210 East Courtland Street
Philadelphia 20, Pa.

Send me the flat, unformed 3-D Relief Map of the United States. I understand our draftsmen can ink in our pipe lines, terminal points, service areas and other data, returning the map to you to be modelled in striking third dimension. Upon receipt of the formed map, you may bill us the amount of $50. If, upon examining the flat, unformed map, I do not wish to order, the map may be returned to you without obligation.

NAME & TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

AERO SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA
Oldest Flying Corporation in the World

Esso Standard Opens Big New Terminal for Refined Products at Waltham, Mass.

Important news to New England oil marketers was the opening of operations last July of the region's first catalytic cracking unit at Esso Standard Oil Company's Everett, Mass., refinery. The ultra-modern "cat" boosted the refinery's output to almost 45,000 barrels per day.

Tied in with the expanded refinery operations is a big pipe line terminal, recently completed in nearby Waltham. There the highly seasonal products of the Everett refinery — domestic fuel oil, kerosene, gasoline and diesel fuel — are stored during periods of slack demand.

Bethlehem Double-Deck Floating-Roof Tanks are especially suitable for the storage of volatile refined products. Pontoon construction provides "dead" air space, protects the product quality and prevents evaporation losses.

Completed early in 1954, the terminal consists of twenty tanks, all designed, fabricated and erected by Bethlehem. Sixteen of these, totaling 1,060,250 barrels, are of the cone-roof type. The remaining four tanks, of Bethlehem's double-deck, floating-roof design, provide what Esso Standard terms "the safest known method of commercially storing gasoline in large quantities."

A letter or phone call to the nearest Bethlehem sales office will promptly bring you full information about Bethlehem Oil Storage Tanks. Or, if you would like a copy of our booklet describing the construction features of floating-roof, lifter-roof, and cone-roof tanks of Bethlehem design, please send your request to:

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

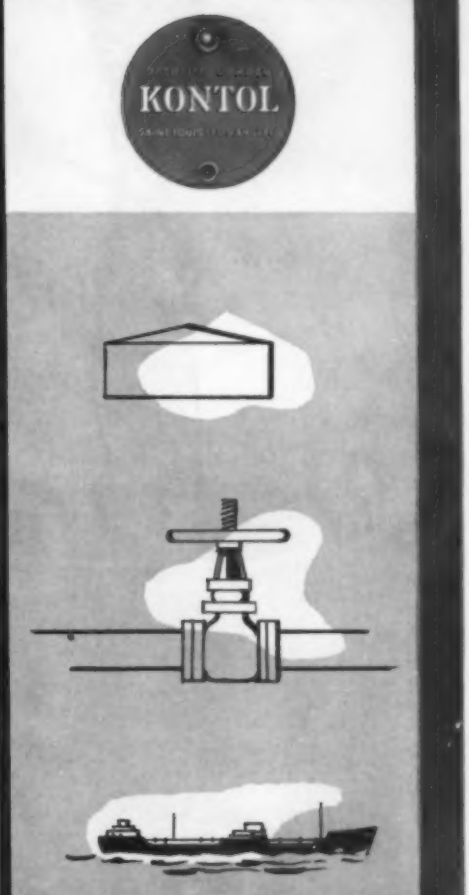
BETHLEHEM STORAGE TANKS

BETHLEHEM DESIGNS AND BUILDS CONE-ROOF TANKS • DOME-ROOF TANKS
UMBRELLA-ROOF TANKS • LIFTER-ROOF TANKS • FLOATING-ROOF TANKS
PRESSURE VESSELS • GAS HOLDERS • PROPANE TANKS

BETHLEHEM STEEL

KONTOL® 77

PREVENTS CORROSION AND RUST FORMATION IN STORAGE TANKS, PRODUCTS PIPE LINES AND TANKERS



Kontol 77 is an oil-soluble organic inhibitor designed to prevent corrosion and rust formation in products lines, storage tanks, tankers, and other facilities for handling finished petroleum products.

Kontol 77 effectively prevents rusting caused by the presence of oxygen in finished petroleum products. It has no harmful effect on the product quality. It does not affect color, octane number, accelerated gum, precipitated lead or other av-gas specifications.

For complete information, call your Tretolite man or write to:

TRETOLITE COMPANY

A DIVISION OF PETROLITE CORPORATION

Saint Louis 19, Missouri • Los Angeles 22, California

KPL 54-17

Chemicals and services for the petroleum industry

DESALTING
DEHYDRATING
CORROSION INHIBITING
SCALE PREVENTING
PARAFFIN REMOVING
WATER DE-OILING

Water treatment gives you better pipe!

To give you quality line pipe that meets your exact specifications, every length of Basalt-Kaiser steel pipe 20 inches and over is expanded by water under great pressure.

Hydraulic expansion increases the strength of Basalt-Kaiser steel line pipe through additional cold working. This takes place within restraining dies assuring accurate diameter, concentricity, and straightness.

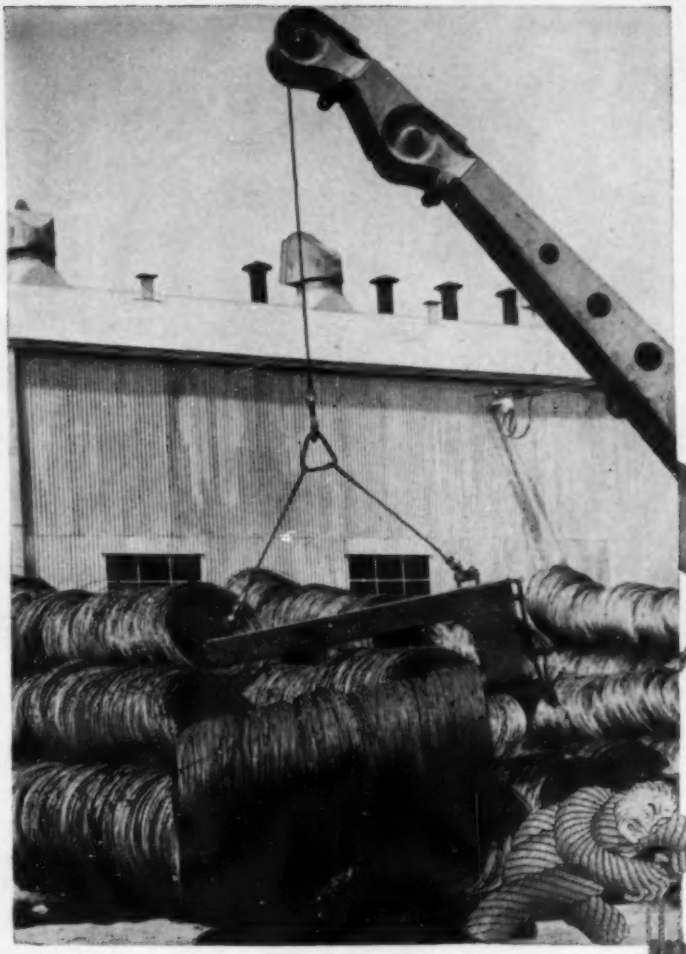
Add to this our *on-time delivery, wide range of sizes* and *prompt personal service* and it's clear why pipeline men know they can rely on Kaiser Steel.

Kaiser Steel

KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	14" to 18" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .375"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	20" to 30" O.D.	Up to 40'	.250" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York



Do Your Worst To This FREE Tuffy® SLING

Tuffy® HOIST LINE

Here's A Twin To Tuffy Slings that's specially designed to match their strength and wearability! Tuffy Hoist Line gives you more safety from drum to sling and built-in service life to handle more loads.

No Chance For Ordering Mixups because there are no complicated specifications! Just tell your distributor the length, diameter and "Tuffy Hoist Line." Try Tuffy, whether you use overhead, stiff leg or mobile cranes, derricks or clamshells!

You Prove How Tough Tuffy Slings actually are . . . to your complete satisfaction . . . with the 3-ft. Tuffy Sling we give you! We're convinced you'll say it's stronger, more flexible, more economical than any sling you've ever used. Here's why:

Tuffy Slings Are Made in a 9-part machine-braided wire fabric construction that's extra flexible to resist kinking. If you do succeed in putting a kink in it, see how easily your Tuffy Sling straightens out with *no material damage.*

Proof-Test Tuffy Up To Twice its rated working load. Prove to yourself that Tuffy Slings are the toughest in the business!

Your Tuffy® Distributor Stocks Against Your Requirements

When You Need Replacement Rope, you often need it *fast.* And that's where your Tuffy distributor comes in handy. Give him an idea of your requirements and he will stock ahead of your replacement schedules from his nearby mill depot. Give him a call now!

union Wire Rope corp.

Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

TEAR OFF AND MAIL COUPON NOW

Union Wire Rope Corporation
2278 Manchester Ave., Kansas City 26, Mo..

At no cost or obligation to me, please rush the material I have checked:

- ☐ FREE 3-Ft. Tuffy Sling!
- ☐ FREE Sling Handbook and Rigger's Manual, Featuring 12 Tuffy Factory-Fitted Types!
- ☐ Name and Address of Tuffy Distributor Nearest Me!

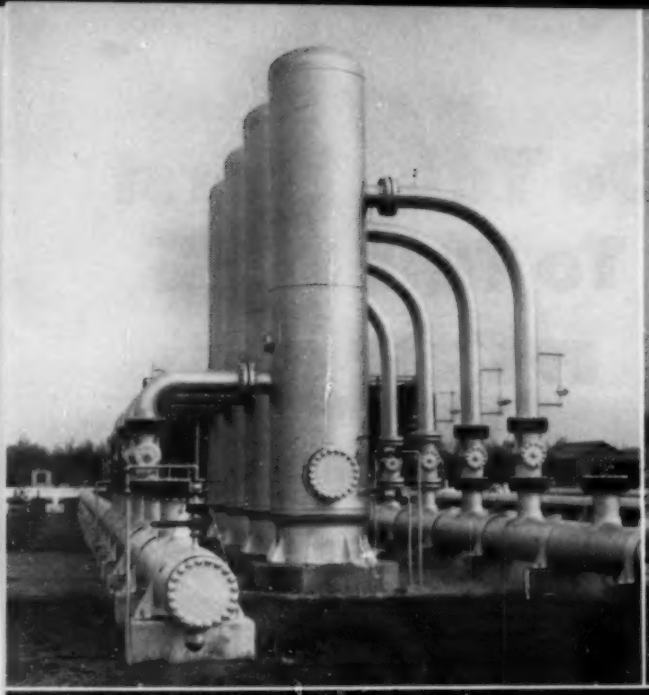
FIRM NAME_____

BY_____ TITLE_____

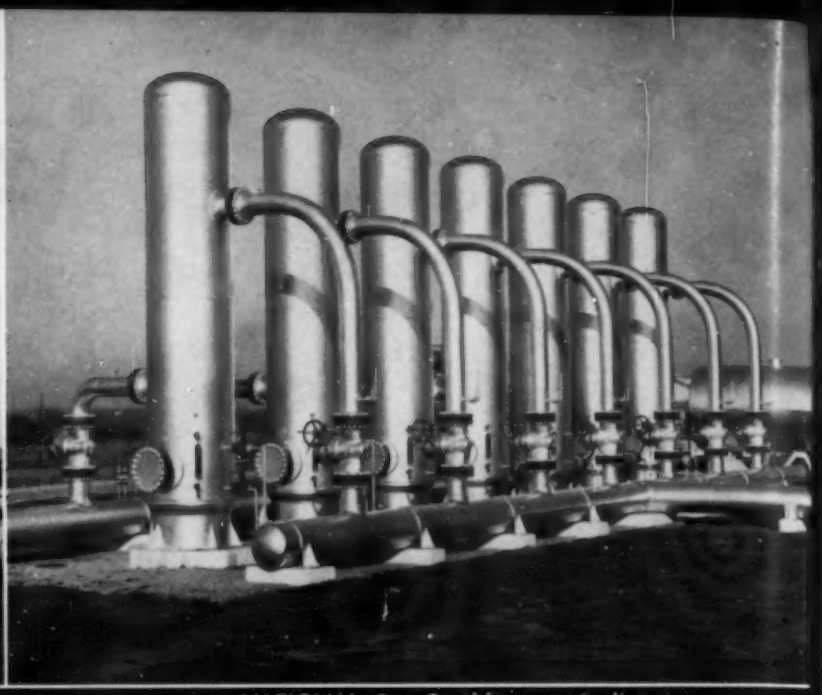
ADDRESS_____

CITY_____ ZONE____ STATE_____

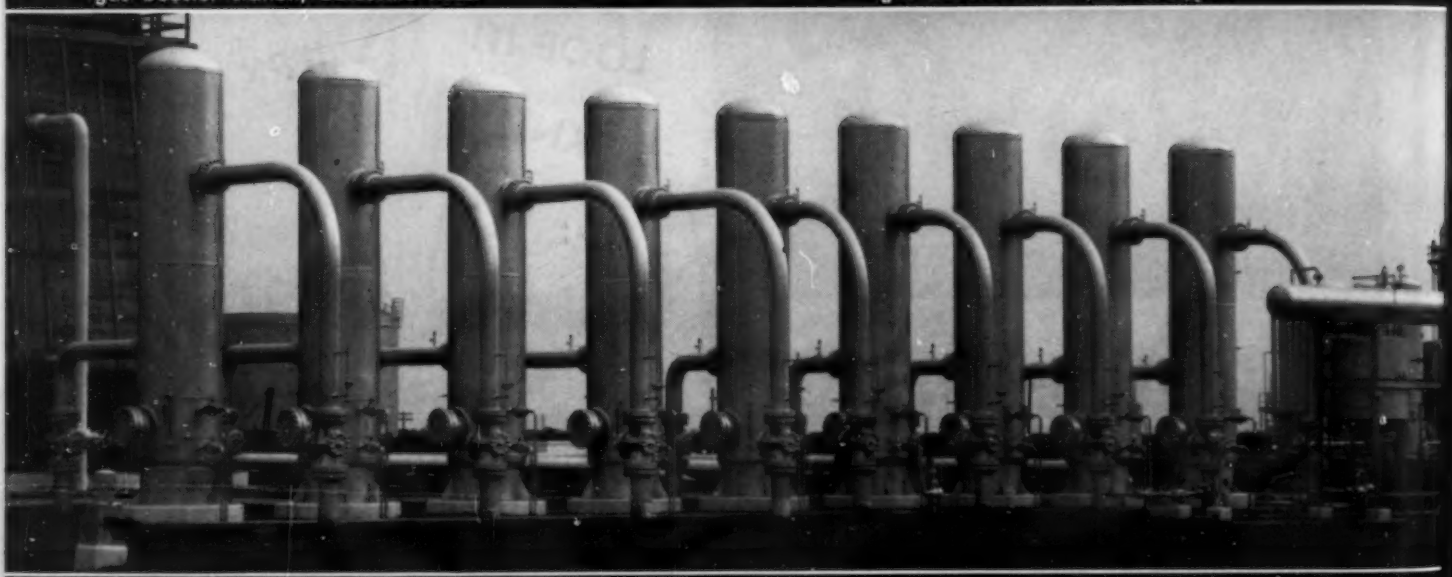
For more data on advertised products, use Readers' Service Cards, last page.



NATIONAL Gas Scrubbers, main line gas booster station, Batesville Miss.



NATIONAL Gas Scrubbers, main line gas booster station, Monroe, La.



NATIONAL Gas Scrubbers, main line gas booster station, Banquitte, Texas

NATIONAL WET-TYPE SCRUBBERS

54" O.D. x 20' — 750 PSI MAX. WP.
90 MM CU. FT./DAY. 12" INLETS AND OUTLETS

The service required of Wet-Type Scrubbers! Pipe line dust and other foreign materials are removed ahead of compressors at each pressure boosting station. This is done best by passing the gas through a special oil bath in a National Wet-Type Scrubber, then removing the liquid particles from the gas stream when passing through the National Gas Scrubbing element in the top part of the Scrubber.

National Vertical and Horizontal Gas Scrubbers are available in a wide range of sizes, working pressures and capacities to fit the needs of gas producers and carriers.

It's a National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA

2-5-54

Laboratory tank with Microballoon* layer on oil surface is shown at left, simulating field installation in which tank is emptied, then refilled.

Up, down. The surface of crude oil in storage tanks may drop one day, rise the next. But an installation of Microballoon* spheres —a half-inch floating blanket— stays in place, keeps the surface *fully* covered. It cuts evaporation loss 80-90 per cent. In an 88-foot diameter cone-roofed tank, that's a saving of 850 barrels a year!

These microscopic spheres of BAKELITE Phenolic Resin look like reddish-brown flour in bulk. Notice how they behave in these laboratory photographs. They seal the surface right up to the tank edge. Some cling to the tank sides as the level goes down. They're picked up again on the way up, and the tank sides are clear.

These spheres are hollow—they float to the surface in a matter of minutes when they're pumped in with the oil. Installation is fast. Since they're non-abrading, they won't harm pumping equipment or pipe lines.

Stop evaporation of costly volatiles now. Learn more about these spheres of BAKELITE Phenolic Resin by writing Dept. AH-78.

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This is one of many testimonial letters received from policyholders of the Texas Employers Insurance Association. These letters tell what policyholders think of the Service and Savings received from the Association.

Ask the Texas Employers representative nearest you to show you more of these letters, as proof of what Texas' largest writer of Workmen's Compensation Insurance can do for you.

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"We are in receipt of your check in the amount of $2,220.51 which represents the dividend savings on our Workmen's Compensation premiums.

"This is a very nice savings, as it represents, together with premium discounts, a total return of 36.5% of the premiums we paid to your company.

"Naturally we realize this would not have been possible without the fine cooperation we received from your claims and safety engineering departments. We are happy with the long and friendly association we have had with you, and we are glad for you to use this letter as our recommendation of your company in your sales solicitations."

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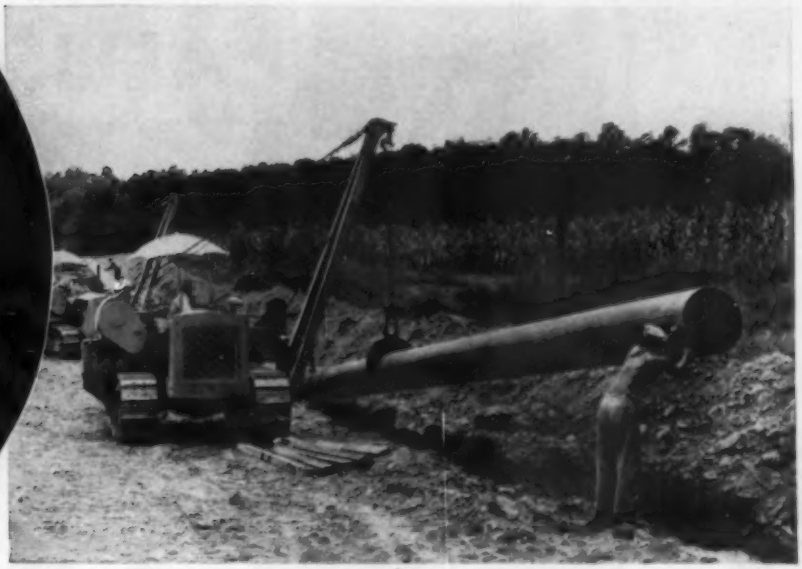
● *Five miles west of Cushing, Okla., 10¾" Republic Electric Weld Line Pipe being laid.*

3 KINDS OF LINE PIPE ALL FROM REPUBLIC



● *This 24" O.D. Electric Fusion Weld Line Pipe is going in as part of a high pressure natural gas pipe line near Leeds, Alabama.*

Need Big Sizes? Republic makes Expanded Electric Fusion Weld Line Pipe in sizes 24" to 30" O.D. And it goes in *fast*. Circumference is always constant. Field joints line up accurately and quickly. The entire circumference can be welded at top speed. And to further speed field welding, uniform wall thickness provides an even distribution of metal all around the pipe.

From 2⅜" to 16" O.D. you can use Republic Electric Resistance Weld Line Pipe. Its high ductility assures smooth, uniform bends in the field or in the shop . . . without severe wrinkling. Uniform high yield strength permits building high pressure lines. Uniform wall thickness means dependability in every inch of the line.

Continuous Butt Weld Pipe made by Republic has been a standard in the oil fields for many years. It comes in nominal sizes ⅛" to 4", is used for gathering lines and many other oil and gas handling needs. It has uniform strength and ductility, tight adherence of the galvanized coating, is easily threaded, readily welded and bent.

When you need line pipe for oil and gas transmission, high or low pressure, remember, you can get all three kinds from Republic. Write for literature.

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Republic LINE PIPE

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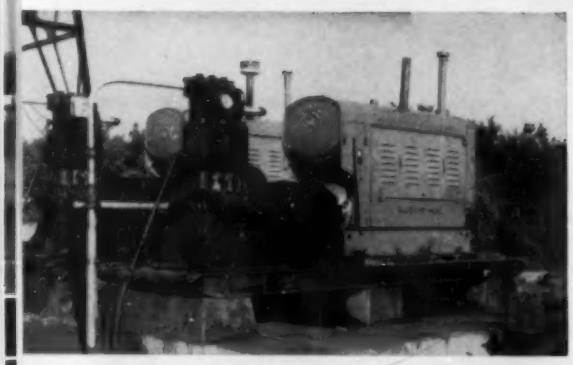
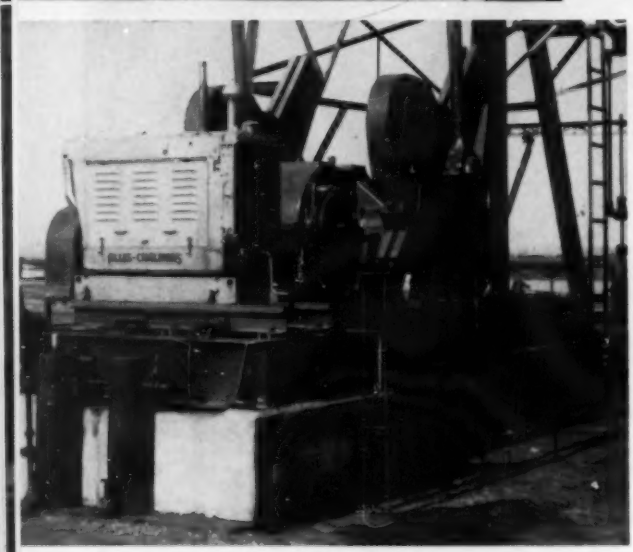
It's the Rule
Not the Exception
For Allis-Chalmers
Engines to Give Long
Trouble Free Service



ALLIS-CHALMERS ENGINES



Just a few examples—

1. Eight years of continuous 24 hour service on pumping well before overhaul.

2. Nine years, 10 Months' continuous 24 hour service on pumping well before overhaul.

3. Over Four Years, pumping 8,800,000 barrels of oil on pipe line pump and going strong. Compression normal, engine running like new—no indication of any repairs needed.

You can expect long service from Allis-Chalmers High Torque slow speed engine.

FOUR Popular SIZES

E — 563, 563 cu. in.
U — 318, 318 cu. in.
W — 226, 226 cu. in.
B — 125, 125 cu. in.

FRED E. Cooper, Inc.
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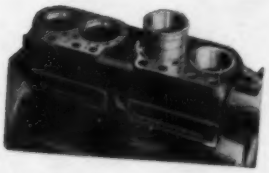
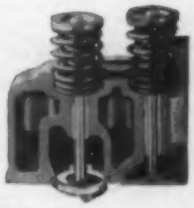
Here's Why!

ALLIS-CHALMERS ENGINES COST LESS TO OPERATE

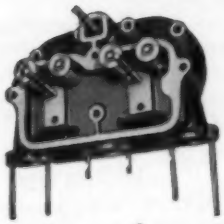
All Allis-Chalmers Engines have Removable Cylinder Sleeves



Valve-in-Head construction



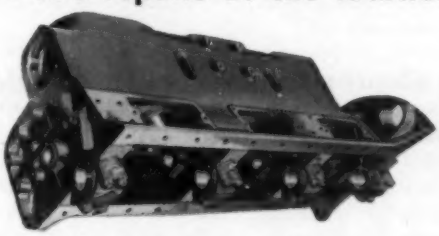
and on the larger size engines one Interchangeable



Head to each two cylinders. Permits one

man to make repairs at the location.

Heavy



Blocks keep parts in proper alignment; Pressure Lubrication to all internal moving parts. Mass Production keeps first cost and repair parts prices low. Sold and serviced by the FRED E. COOPER **organization, who care enough to service every engine when it is put on the job. Repair parts service available in all oil producing areas through the vast facilities of the Allis-Chalmers branches and dealers and Fred E. Cooper, Inc. branches.**

COMPARE

Allis-Chalmers Quality
Allis-Chalmers First Cost
Allis-Chalmers Parts Cost
With those of any other engine.

FRED E. Cooper, Inc.

P. O. BOX 1890 TULSA, OKLA.

Houston, Odessa, Los Angeles, Olney

THE MEDICAL HISTORY of a patient, being studied here by the author, has a vital role in efficient human maintenance.

Human Maintenance Pays Off!

Here's how one company brought about reductions in the incidence of heart disease, overweight, back disabilities, hernias and digestive tract complaints.

By DR. E. P. LUONGO, Medical Director,
General Petroleum Corporation, Los Angeles

THE METHOD of periodic physical examinations for 6000 employes in General Petroleum Corporation consists of a planned procedure, furnished at regular intervals, depending on age and occupation. The spirit governing the examination is one of spontaneous cooperation, based on attractive benefits pointed out to employes through appropriate educational media.

Examinations are offered to all employes. Those under 40 are scheduled every two years, and those over 40 every year. Some employes with certain physical defects may be examined every three or every six months. Some in occupations with certain potential occupational hazards are also examined at more frequent intervals.

Physical examinations are performed either by physicians of the medical department or by private physicians designated by the medical department. The scope of the examination is determined by medical history regarding signs or symptoms showing departure from normal organic, emotional, or mental health, guided to some extent by a brief questionnaire filled out by the examinee. Questioning may relate to human or job relations, with particular reference to conflict at an occupational level. Some psychologic evaluation pertaining to job interest, aptitude, or job placement, is done when indicated. Insight into family relations is obtained, when necessary, by tactful questioning regarding family problems, marital conflicts, and financial worries. With older employes, particularly those reaching retirement age, an attempt is made to evaluate adjustment to age, including diet, physical exercise, use of tobacco and alcohol, as well as questions about hobbies or avocations, all of which is considered part of the medical history.

This program applies to all employes, and there is no attempt made to evaluate periodic examinations with any line of demarcation drawn between executive and non-executive. Unfortunately, there is a growing tendency today to overemphasize the health problem of executives. In our experience we have found that executives are no more prone to ulcers, coronary disease, or various neuroses involving "dependent behavior" than are the non-executives in the same age group.

Organic Health Appraisal—Let us now evaluate the appraisal of the employe's organic health—in terms of the benefits it produces. First, the benefits to employes:

By regular examination, healthy employes are reassured against doubts as to their physical condition; hypo-

chondriasis is reduced. Through advice given to employes regarding physical defects which may be found, employes are assisted in maintaining their health. The impact of disabling organic disease is reduced by early detection, and employes are encouraged to seek treatment from their private physicians before irreparable harm is done. In General Petroleum, the following has been experienced (with due consideration given to age of employe population):

- The incidence of disabling and fatal cardiovascular heart disease has been decreased 15 percent since 1948.
- There have been no disabling consequences among diabetics since 1950.
- The incidence of overweight has been reduced from 25 percent of employe population in 1951 to 15 percent of employe population in 1954.
- Mortality from malignancies of internal organs in males has dropped 33 percent since 1948.
- Disabling diseases of the digestive tract have dropped 20 percent from 1948 to 1954.
- In females, the mortality from breast and pelvic malignancies has decreased 50 percent since 1948.

As a result of reduction in morbidity of disabling illnesses, there has been a concurrent reduction in wages lost due to absenteeism for chronic degenerative diseases and malignancies.

To General Petroleum as an employer, the appraisal of the organic health of employes yields these benefits:

Between 1948 and 1954, the company has experienced less industrial accidents due to pre-existing physical disabilities in all age groups. As a result, Workman's Compensation costs for certain types of injuries and diseases have been reduced. For example: costs for industrial hernias have dropped 40 percent since 1948. Costs for serious back injuries were reduced 33 percent. We have had no claims for "industrial" heart cases in six years. Occupational disease of skin has been reduced 80 percent.

In the field of industrial hygiene, the physical examinations have enabled the company to control more effectively the effects of possible unhealthful exposures in the working environment. We have been in a better position to meet the requirements of laws and regulatory orders involving the health of personnel on the basis of information obtained on physical examination which has been transmitted to the management.

Here are the conditions for good health— How do YOU measure up?

Health does not consist only of being free from mental or organic disease, declares the author. He says conditions for health in any individual are:

A. Past history
   1. A wise "selection" of antecedents in preceding generations.
   2. A reasonably happy and emotionally-secure childhood.

B. Present or adult history
   1. A satisfactory home and occupational situation.
   2. Freedom from organic or mental diseases.
   3. A sense of humor.
   4. Opportunity for self-expression in creative endeavor.
   5. Sufficient rest and non-competitive but productive leisure, with ability to change pace.
   6. Physical, mental, cultural, and educational fitness for occupation.
   7. A true sense of humility toward one's ability, both in success and in failure.
   8. Adequate social mores or roots in the community, and a willingness to bring benefits to the community without thought of material gain. This requires a charitable attitude toward one's family, friends, and neighbors.
   9. Ability to adapt to age (more psychologic than physiologic).
   10. A spiritual point of reference outside of secular or material existence, and sufficient faith to leave some things beyond mortal control to the "powers that be."

Finally, the community at large benefits:

The economic "health" of a community is affected by the health status of workers living in that community. When a communicable disease, such as tuberculosis, is detected in its early stage at the time of periodic examination, the spread of this disease is inhibited. When there are a maximum number of workers reporting to the job, and working at an optimum level of efficiency, the butcher, the baker, and the banker are benefited. In preventing disabling consequences of diseases, there is a reduction in the number of families suffering large economic losses from serious illness or early death of the bread winner. Some of these families could become public charges.

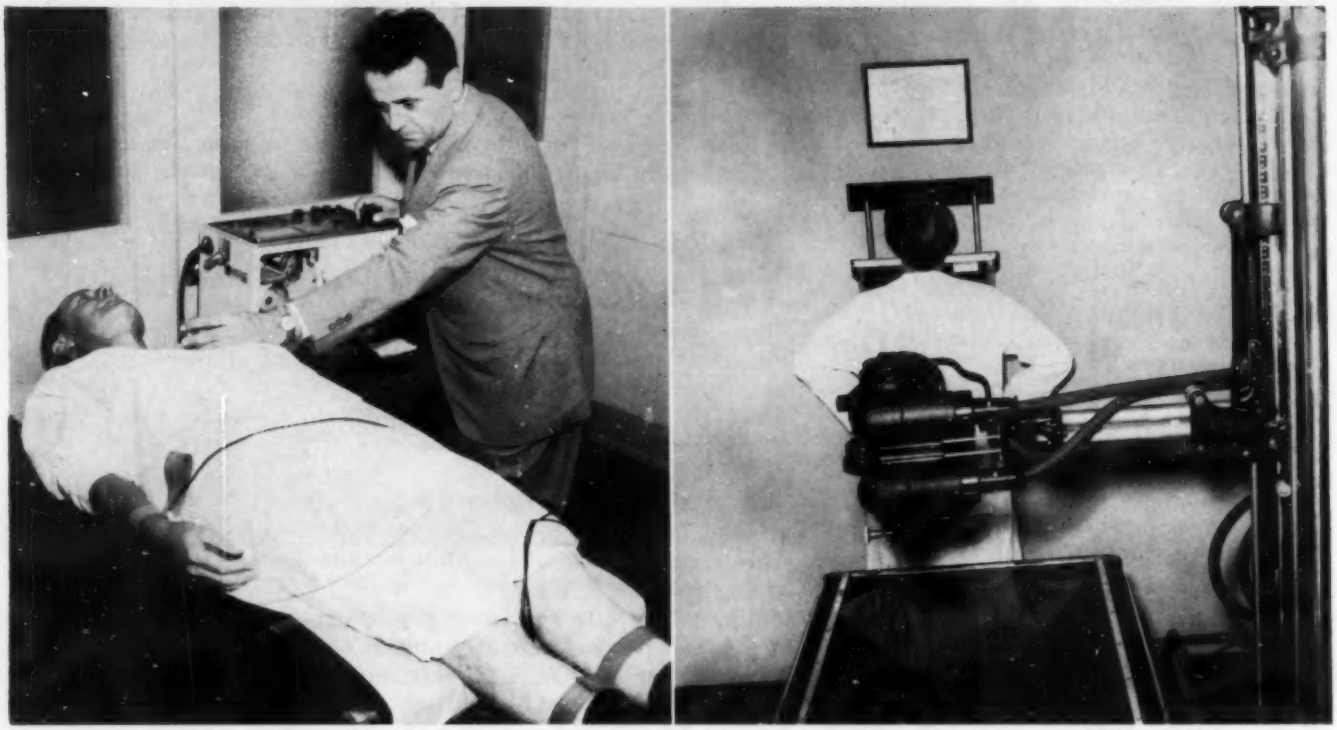
These are the benefits to the employe, the employer, and the community at large which spring from the first of the three appraisals used in our program of periodic physical examinations.

Mental Health—Now consider mental health and psychosomatic complaints:

Any physician with some interest in psychologic or emotional reaction can detect most of the cases in industry where there is an interplay of stress, either on an occupational or on a non-occupational basis.

There is some doubt here as to the advisability of formal programs in industry for psychologic or psychiatric evaluation of employes. By formalizing psychologic or psychiatric services in industry, there is a tendency to overestimate or overextend the area of employe population needing this service. Only a very small percentage are candidates for formal psychologic evaluation, and there are an even smaller group for psychiatric evaluation. From 85 to 95 percent of employes with emotional difficulties, either occupational or non-occupational, can find solutions to their problems with the help of their foremen or supervisors, the industrial physician, the private physician, family, friends, relatives, or a minister. Any employe who can solve this emotional conflict with the aid of one of these sources, has no business in the office of a psychiatrist or a psychologist.

Psychosomatic or mental health problems are considered at the time of periodic examination of the employe, or on special referals to the medical department by foremen and supervisors who may suspect that the employe is having emotional difficulties on the job. In recognizing such an employe as a complete individual with a home, family, financial worries, as well as problems related to other employes and supervisors, the majority of these cases can be handled by analyzing the stresses with the individual. We attempt to help the employe gain an un-



THE ORGANIC HEALTH appraisal reassures healthy employes against doubts as to their physical condition. For others, the impact of disabling organic disease is reduced by early detection, and employes are encouraged to seek treatment from their private physicians before irreparable harm is done. Electrocardiagraphs (left, above) are a part of the periodic physical checkup. X-ray (right, above) examinations are taken frequently.

derstanding and insight into his behavior. However, the appraisal of the employe's mental health, his psychosomatic complaints, and the potential sources of stress which may exist in his environment, constitute a large and significant part of our periodic examination program.

Let us evaluate this appraisal, from the separate viewpoints of the employe, the employer, the medical profession, and the community at large, in terms of benefits produced.

First, benefits to the employe: Benefits derived from periodic examination in the field of emotional and mental health are as important as those related to organic health. By considering an employe as a total or "whole being," we have been able to assist and counsel him on problems for which he often hesitates to seek counsel from other qualified sources. As a result, the incidence of "nervous breakdowns" or severe disabling psychoneurosis among employes in this company has diminished 25 percent during the six-year period between 1948 and 1954. By showing an interest in their emotional problems, employes receive a real feeling of "belonging" in their work with the company.

EMPLOYES ARE ENCOURAGED in the matter of frequent eye examinations.

Next, the benefits to the employer:

There has been a reduction in explosive human relations problems due to emotional upsets. Industrial accidents due to emotional problems also have been fewer. The company has another channel of communications with employes, and the trained observation powers of medical personnel are available to management in spotting personnel and human relations problems. By showing a concern for employes as individuals, the company benefits in improved morale.

To the community at large, the appraisal means there is a reduction in the number of disabling neuropsychiatric cases in the community and this decreases the number of families suffering economic losses.

Health Habits—The third element in our periodic examination is the employes' health habits.

At time of periodic physical examination we question the employe with

regard to his nutrition, physical exercise, avocations, and sometimes on how he "treats" his private physician. We have found that a large number of employes have functional ailments caused by too much work or too much play.

Avocations are extremely important to those employes in industry who may have unrealistically high standards with regard to their mission in life or who have a wide discrepancy between their capabilities and goals. Some of these cases can be adjusted through suggestions as to recreation and avocations, and we feel that this type of advice may be pertinent to the prevention of coronary attacks in some cases.

At the time of periodic examination we attempt to educate employes on the significance of questions which physicians may ask concerning their health. We point out the limitations in medical science, both in the diagnostic and therapeutic field. We attempt to condition them to the idea that the shock of knowing about a disease, resulting from a doctor's diagnosis, wears off quicker than the uncertainty of continual worry and wonderment about the possibility of disease.

Most, in fact 95 percent, of the employes would rather face facts than live in false security, a state of mind which is spawned to greater degree by not knowing than knowing the facts. Even in the case of any employe with a mortal disease, the majority like to be told so that they can mend their fences, moral, financial and otherwise. The "bogey man" in hiding is much more of a threat than when out in the open. We can never lick malignancies with our present knowledge until we get the "bogey man" out of the basement of peoples' subconscious by encouraging them to undergo periodic checkups. Hush-hush attitudes on malignancies and other diseases are not only reactionary but foolish.

What are the benefits which arise from the appraisal of health habits of employes?

The appraisal of health habits at time of periodic examination gives the employe an additional opportunity to further his personal education and information on health and hygiene. Because of this knowledge he enjoys a better relationship with his private physician, since he feels he can intelligently discuss his health problems with the physician. The health education he receives as part of his periodic examination may also spare him confusion, time, and expense by being able to evaluate more intelligently unorthodox, costly, and sometimes dangerous, health promotion methods and schemes advertised in a community.

The information these employes receive on health education is disseminated widely through a community by word of mouth. This makes an ever-increasing contribution to the betterment of community health standards.

The Liabilities—What are the liabilities? In a true evaluation, as we are attempting here, we must not only look at the assets produced by what we are evaluating, we must also look at the liabilities.

What are the liabilities produced by a program of periodic physical examinations for employes?

From the employe's viewpoint, if information on periodic physical examinations is used improperly and causes him temporary or permanent economic losses in reassignments, lack of promotion, or termination, then from his viewpoint a scheduled periodic examination can be a poor quality action and a loss.

Some employes also sustain losses in having a false sense of security following a periodic examination and later experience a heart attack or some other serious disease (2 to 3 percent).

If a periodic examination program is carried out in a manner which causes frequent labor relations difficulties, then the procedure would have to be considered as a possible poor quality action and the difficulties would be considered losses. We find that occasionally a decision resulting from a periodic physical examination becomes a labor relations matter, but these situations usually can be resolved amicably by a frank discussion between the industrial physician and union representatives.

So there we have the assets and the liabilities which grow out of a program of periodic physical examinations. We are ready to "strike a balance."

In providing periodic examinations for employes, American industry is contributing its share toward the improvement of health standards in communities.

These programs should be more widespread in industry so that advanced stages of preventable or curable diseases will be rare occurrences in our clinics and hospitals.

The value of periodic examinations has been challenged. Some suggest that the benefits derived from periodic examinations may not be worth the cost in time and money and the risk of creating hypochondriasis in employes.

Value Proven—We have drawn up "balance sheets," each recording assets and liabilities of periodic physical examination from the differing points of view of these groups. As a result it has been determined in General Petroleum Corporation:

Periodic physical examinations yield a net gain. A maximum number of workers are kept on the job at an optimum level of efficiency. Industrial accidents due to emotional upsets are fewer and workmen's compensation costs are reduced. The management obtains another channel of communications with employes and gets the benefit of the trained observation powers of medical men. The evidence of a true concern for the well-being of employes has been found to improve morale and to increase the acceptance of the company by the general public, creating a better reputation in the market place, increasing confidence among stockholders, and a more cooperative attitude from regulatory bodies. These "assets" more than offset the "liabilities" incurred by the company, chiefly the cost in time and effort.

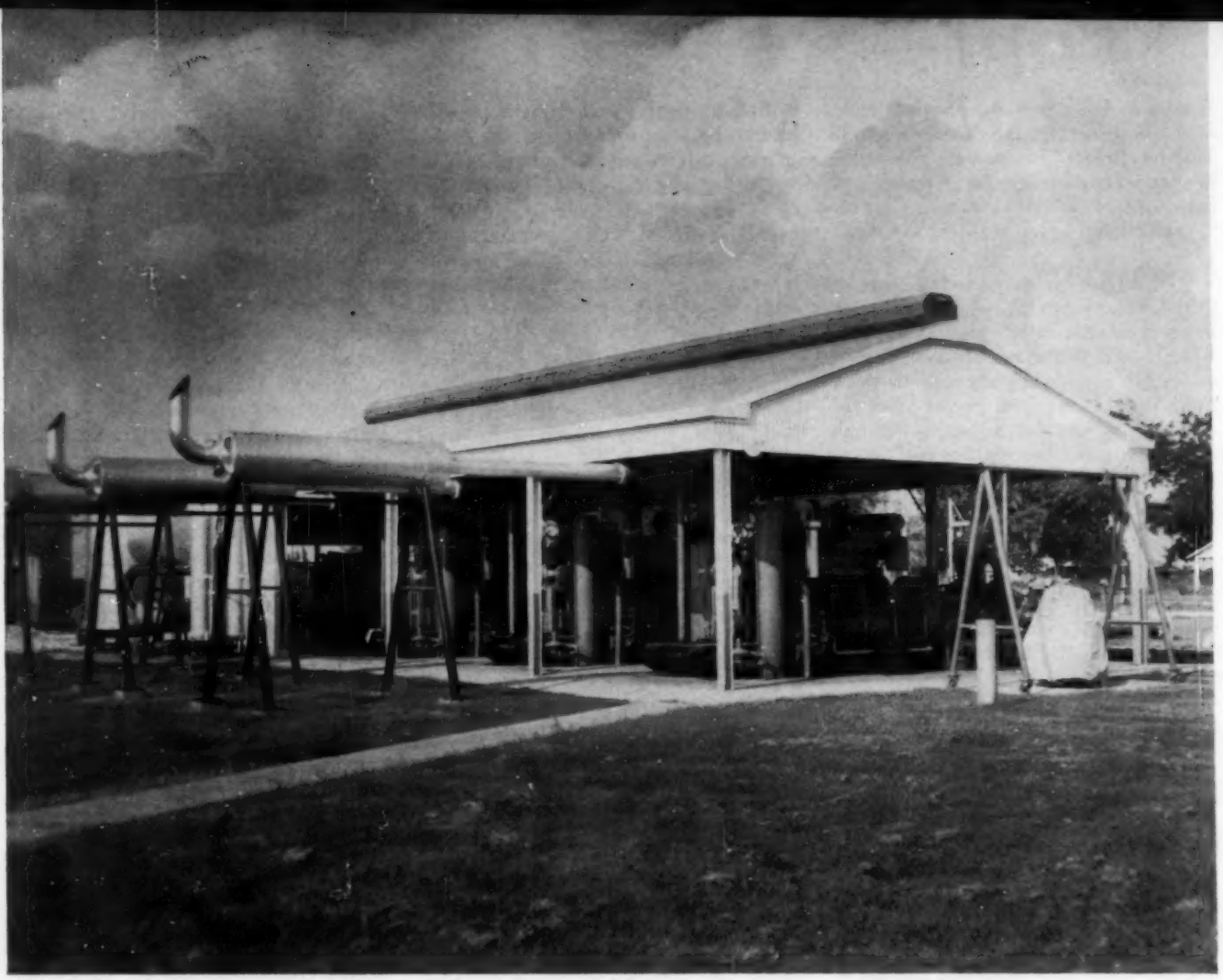
To the employe, periodic physical examinations also yield a net gain. Examinations reassure healthy employes. Employes subject to organic disease receive information on these disabilities in time to seek treatment from their private physicians before irreparable harm is done. Experience has shown that many would not have received such information until serious symptoms appeared.

General Petroleum's experience has shown significant reductions in the incidence of heart disease, overweight, back disabilities, hernias, digestive tract diseases, and in female malignancies.

In the field of mental health, the periodic physical examination has given employes assistance and counsel which often they hesitate to seek in a busy office of a private practitioner.

Employes lose less time at work through sickness and disability.

These "assets" more than offset the "liabilities" incurred by a few employes through periodic physical examination. About 0.5 percent with disabilities of a temporary or permanent nature are affected in job security by information gathered through these examinations. Only a few employes develop a false sense of security after such examinations. Hypochondriasis is reduced. —The End



INTERSTATE OIL PIPE LINE COMPANY'S NEW IBERIA (LA.) PUMP STATION

How Instruments Carry the Load At Interstate's New Iberia Station

Line pressure 13 miles away must control the rate of pumping at this Evangeline Country pump station that was made from portable pumping units.

By CHARLES F. BARNARD, Interstate Oil Pipe Line Company, Shreveport

ONE OF THE MAIN problems that had to be overcome in designing Interstate Oil Pipe Line Company's New Iberia, La., pump station was that field gathering lines on the discharge side of the station would inject into the line at unpredictable and unscheduled times. This meant that the pumping rate at the station would have to be lowered at the time the units were injecting to protect piping near St. Martinville some 13 miles downstream.

The purpose of the New Iberia station, located a stone's throw from the banks of Bayou Teche, is to pump crude oil from Southwest Louisiana to the Standard Oil Refinery at Baton Rouge. It has three main centrifugal pumps that originally were designed as high-speed portable pumping units. (See PIPE LINE INDUSTRY, October, 1954.) Other major equipment items at the station are a 50,000 bar-

rel floating-roof tank and an engine-driven deep well type booster pump. The tank floats on the incoming pipe line so that the station pumping rate can be varied.

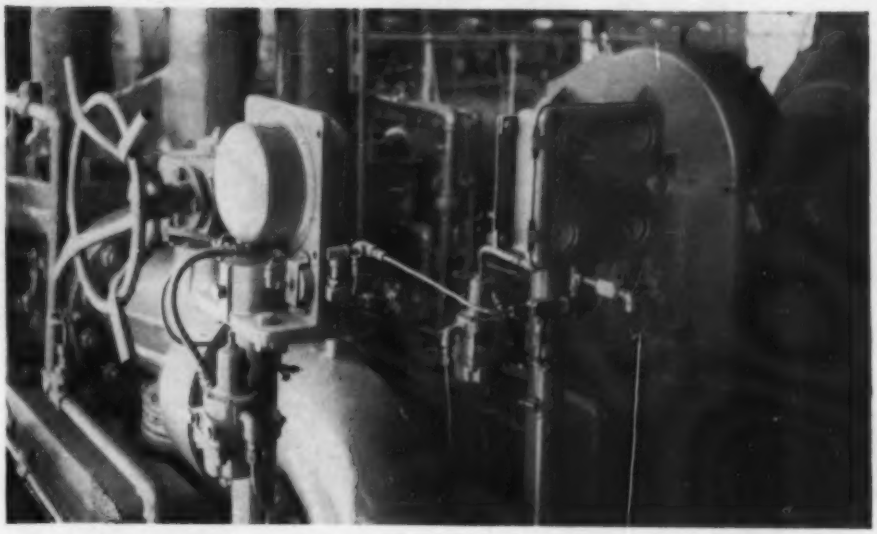
Near St. Martinville, on the discharge side of the station, the line is limited to a working pressure of 700 pounds per square inch. Between this point and the station there are numerous field units injecting into the line at unpredictable times. For this reason, a discharge pressure controller at the station would not offer sufficient protection to the system.

The solution to this problem was achieved by the hook-up shown in Figure 1. The engine speeds are controlled by hydraulic-type governors with their speed-setting automatically positioned by the air output from either of two pressure controllers. In order to maintain pressure on the pipe near St. Martinville at the allowable and still enable the station to pump at its maximum rate when the field units are idle, the station engines' speeds are controlled by the pressure on the pipe near St. Martinsville.

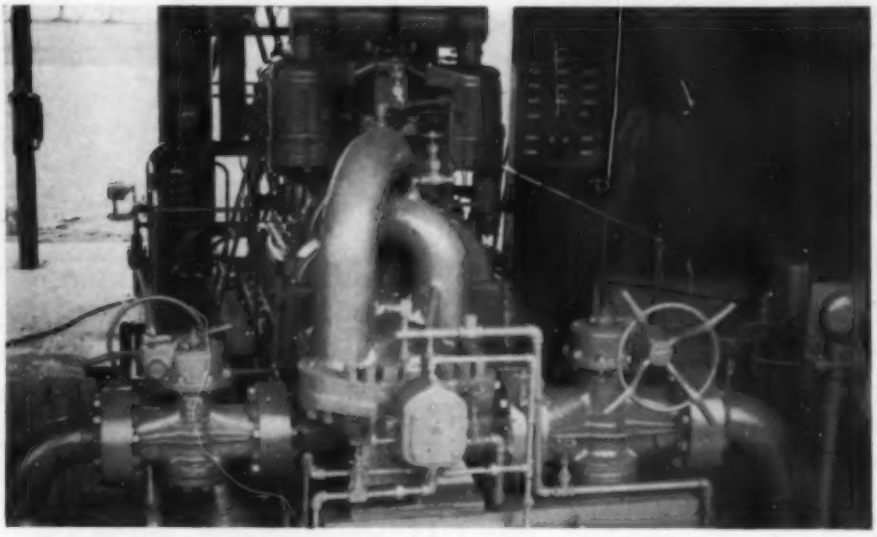
The pressure is telemetered over a leased telephone circuit to another pressure controller at the station which actuates the governors and maintains the pressure at St. Martinville at the set point.

In the event the telemetering system fails due to power failure or grounded telephone lines, or in the event of rupture of the pipe, the indicated pressure on the station controller will fall and a limit switch will energize a solenoid valve which in turn limits the controller output. This positions the governors so that the engines will come to an idling speed; otherwise, the engines would come to their maximum speed setting, trying to raise the pressure at the pressure point. If the pipe had ruptured this would spill more oil on the ground, and if the telemetering circuit is at fault the pressure would rise far above the allowable with disastrous results.

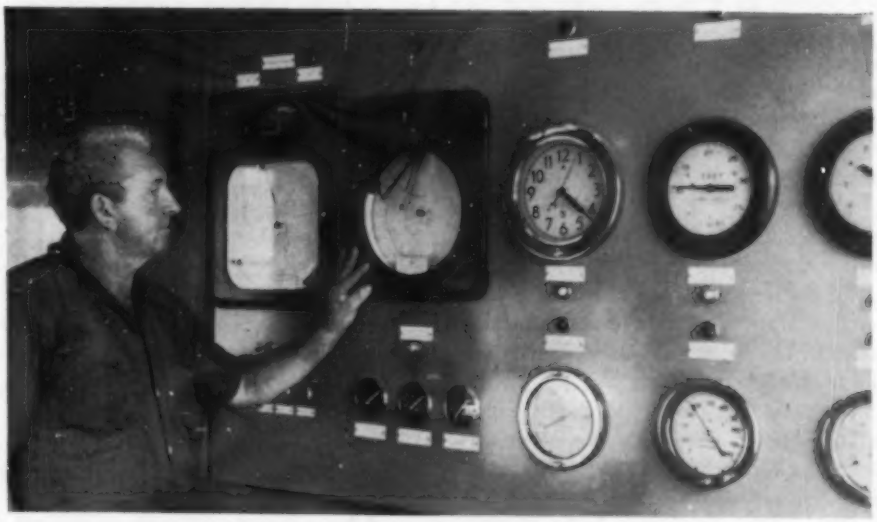
The operator can determine at the controller whether the reduced pressure is due to a line break or a fault in the telemetering system. If the telemetering system is at fault he can transfer the speed control to the station discharge pressure controller by positioning a three-way valve on the main control panel and continue to pump at a safe reduced rate until the



STATION LOW SUCTION PRESSURE SHUTDOWN DEVICE and suction pressure transmitter with pump and speed increase in the background.



PUMPING UNIT with control panel at the right.



INSTRUMENT PANEL INSIDE CONTROL ROOM. Pumping gage is controlled by telemetered signal from St. Martinville some distance away. When field gathering lines are injecting into the discharge line, pumping rate of New Iberia station must be cut back so as not to exceed working pressure of downstream line.

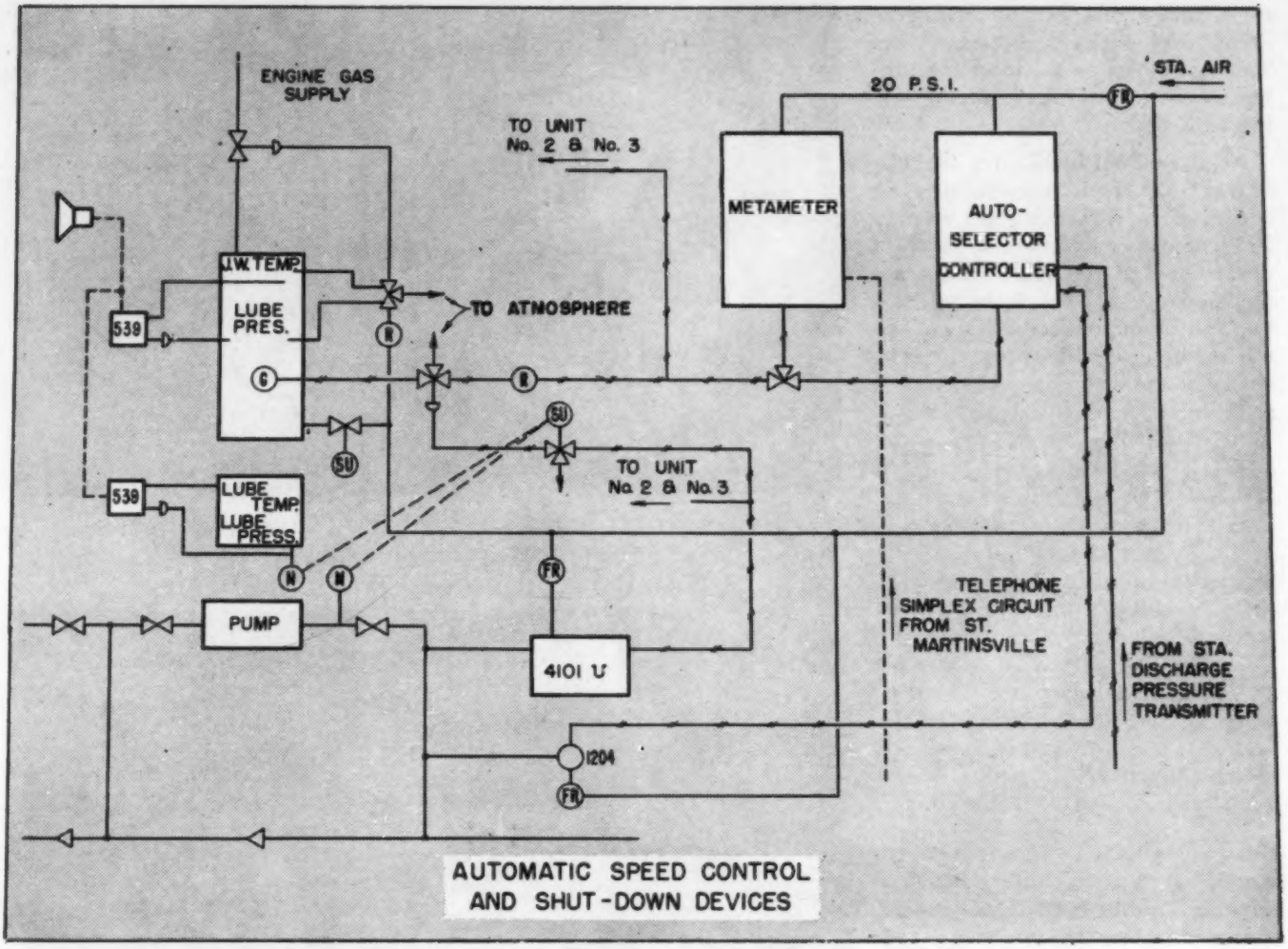


FIGURE 1

telemetering system fault is corrected. If the pipe line has ruptured, the station can be shut down and field personnel contacted by short wave radio so that they may shut the field units down and repair the line break.

A small pressure reducing regulator shown as R in the controlled air line from the controllers to the governor marked G in Figure No. 1 is used for starting the engine and bringing the engine up to the speed called for by the controller. If another unit is already on the line, its speed is automatically reduced as the other is increased manually. Once the manual reducing regulator is wide open all of the engines and pumps will run at the same speed that is necessary to maintain the pressure at the set point on the controller.

With two or more pumping units on the line, a unit may be taken off by reducing its speed with the pressure regulator. With the air pressure to the governor reduced to atmospheric pressure the other engines' speed will increase automatically and the governor of the engine being taken off the line will position the fuel rack to the off position; the engine lube oil pressure will drop and the three-way valve in the air line to the bellows-controlled gas valve will dump the air from the bellows and shut off the gas supply to the engine. The three-way valve is manually reset whenever the engine is to be started.

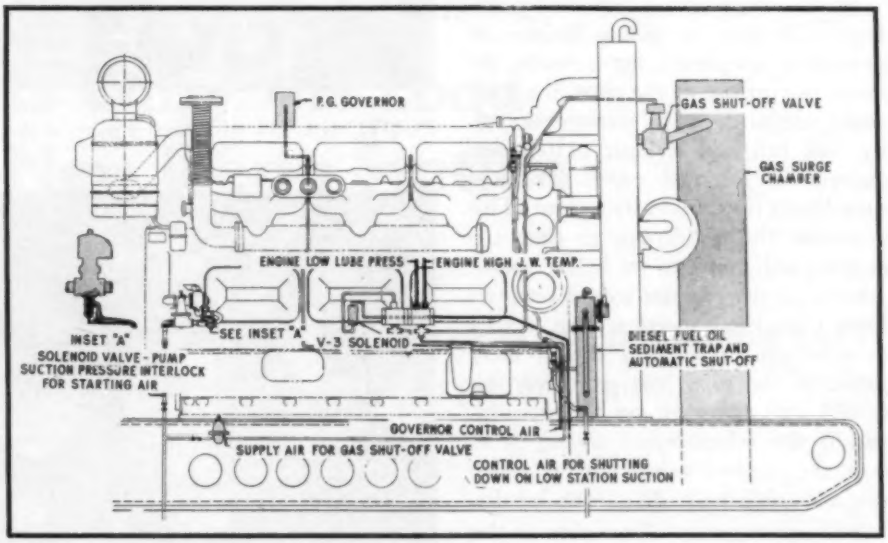

P.G. GOVERNOR
GAS SHUT-OFF VALVE
GAS SURGE CHAMBER
ENGINE LOW LUBE PRESS
ENGINE HIGH J.W. TEMP.
INSET "A"
SOLENOID VALVE - PUMP SUCTION PRESSURE INTERLOCK FOR STARTING AIR
SEE INSET "A"
V-3 SOLENOID
DIESEL FUEL OIL SEDIMENT TRAP AND AUTOMATIC SHUT-OFF
GOVERNOR CONTROL AIR
SUPPLY AIR FOR GAS SHUT-OFF VALVE
CONTROL AIR FOR SHUTTING DOWN ON LOW STATION SUCTION

Fig. 2—Control devices located on engine.

Whenever the station is to be started, suction pressure is sensed by

Continued on Page 57

How Emergency Repair Kit Works . . .

THE EMERGENCY REPAIR KIT, shown on Page 70 of the October issue of PIPE LINE INDUSTRY, has been the subject of many inquiries from readers. Here is a photo of a model showing how it is hooked up.

Used to repair blowouts in remote areas, the kit, all eight-inch pipe, can be used as far as 1000 feet from a mobile unit and can be installed within a few hours. It was devised by Gulf Interstate Pipe Line Company.

Pipe line crews remove the damaged pipe at the break, bevel the open ends, weld on the kit's special weld caps and connect a manifold to each which are, in turn, connected by three eight-inch lines. All repair kit connections are of a quick-type coupling; the couplings on pipe and swing joints having O-ring seals that set when pressure hits them.

All parts of the kit, which can be left in service until permanent repairs are made, can be carried easily by two men.

Instruments Carry Load

Continued from Page 56

the 4101 U controller and the controller marked M on the suction side of the pump to be started (shown in Figure 1). With sufficient station suction pressure the 4101 controller will deliver an output air pressure to the solenoid valve marked SU in the controller output line. If sufficient suction pressure is present at the pump the controller marked M will operate the aforementioned solenoid valve as well as the other solenoid valve marked SU. This allows the three-way valve in air line to the governor to position itself to allow controlled air to reach the governor, and the second solenoid valve marked SU allows starting air to be applied to the engine air starter.

The individual pumping units are shut down by (1) a built-in device on the engine whenever the lube oil pressure is too low or the jacket water temperature is too high; (2) the device marked M on the suction side of the pump whenever the pump suction pressure falls below a set point; (3) the device marked M on the speed increaser whenever the speed increaser lube oil pressure becomes too low.

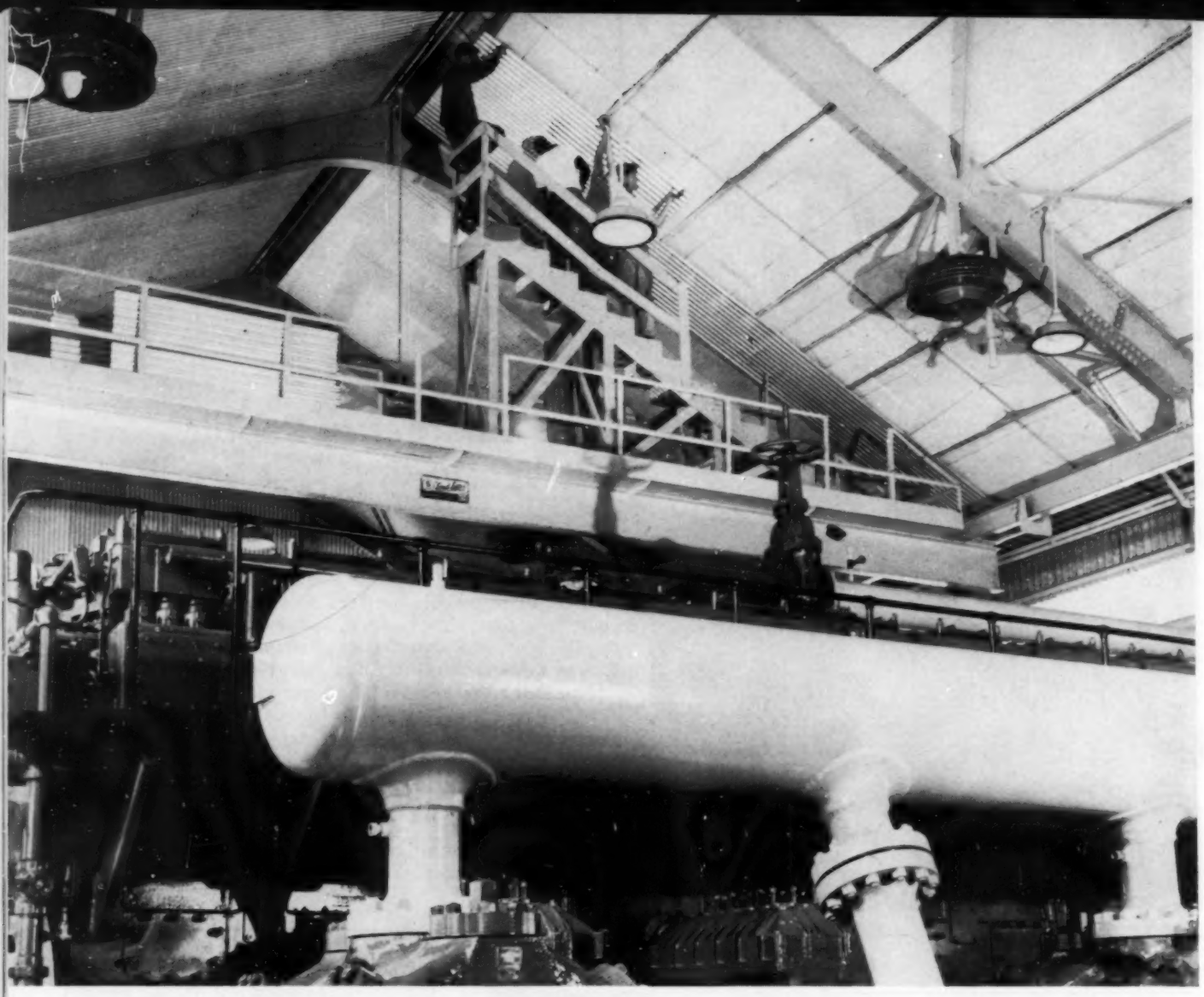
All shutdown devices position the fuel rack to the off position directly or indirectly by bleeding the air supply from the governor.

The station low suction pressure shutdown device is set for the minimum NPSH requirements of the pump (allowing for crude oil vapor pressure) and the unit low suction pressure shutdown device is set at a slightly higher setting so that if the pumping rate is increased such that the station would be shut down due to low suction pressure one unit will be shut down relieving the low suction pressure condition and saving an entire station shutdown.

The station has been in operation for nearly two years with a very small amount of maintenance work. It is believed that the safety and control devices have played a very important role in the low maintenance at this station. —**The End**

About the Author

CHARLES F. BARNARD was born in Miami, Okla., where he attended elementary school. Completing high school in Tulsa, he was employed by the U. S. Indian Service for approximately three years before he entered college at Texas Technological College. He received his degree in electrical engineering from Texas Tech and was employed as service engineer by General Electric X-Ray Corporation in Oklahoma City. He joined Interstate in 1946 and is now a senior engineer.



WORKMEN APPLY PERFORATED CORRUGATED ALUMINUM over the glass fiber blanket that is attached to the ceiling. This installation has greatly improved working conditions.

Here's how to . . .

Control Noises in the Engine Rooms

By insulating exhausts, ceiling and portions of the walls, Texas-Illinois Natural Gas Pipe Line Company has reduced the noise level to the point that conversation is easy and the operators perform their tasks more efficiently.

By SEYMOUR LASCO, Texas-Illinois Gas Pipe Line Company, Chicago

THE SWITCH from the slow-speed horizontal compressor engines to the modern high-speed, high-horsepower angle type has resulted in more efficient pipe line operations; but at the same time, it has resulted in more acoustic noise.

When several of these engines are operated simultaneously in an engine room whose bounding surfaces are hard and highly reflective, noise levels of 113 decibels or more are produced

This is enough noise to make verbal communication between operators virtually impossible, and telephone conversations are difficult even in the sound-insulated telephone booths. It is also enough to reduce efficiencies of some workers.

To combat conditions such as these and improve working conditions, Texas-Illinois Natural Gas Pipeline Company has applied acoustical insulation to a number of its compressor stations.

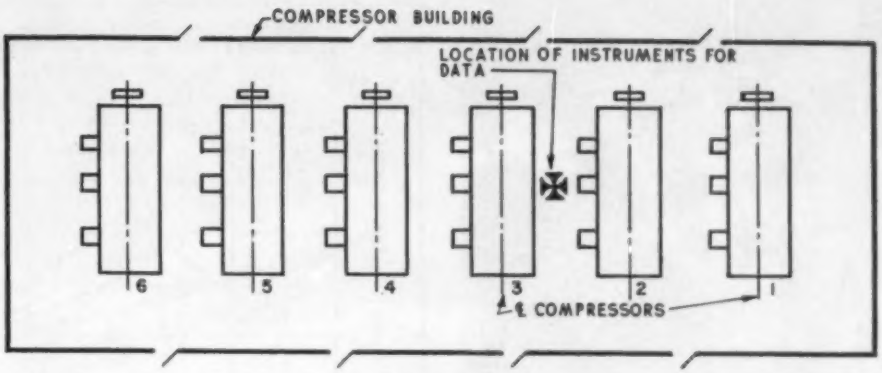


FIGURE 1

Compressor buildings. Texas-Illinois has 11 compressor stations located at approximately 100-mile intervals on its system. Several of these stations have six vertical-type engines of recent design as the prime movers, and one station has five such engines. These are 10-cylinder engines rated 2000 horsepower at 320 revolutions per minute, and they are housed in engine rooms 182 feet long and 48 feet wide. The arrangement of these engines is shown in Figure 1.

The engine room is a steel frame building covered with a corrugated asbestos material. Large areas on the side and end walls are glass, and a four-foot wide corrugated translucent strip runs around the side and end walls just under the eave as illustrated in Figure 2. The floor of the engine room is concrete.

When the stations went into operation, the noise level in the engine rooms were considerably higher than had been anticipated. Noise levels of 111 to 113 decibels were encountered throughout most of the building. As a result, it was decided that a noise abatement program should be instituted.

Due to the lack of information on definite means to control the noise, experimental work was undertaken. The company station near Marshall, Texas, was selected as the site for this work.

Preliminary studies. The first step was to analyze the problem. Three instruments were purchased for this purpose at a cost of about $900. They were: sound-level meter, an octave-band analyzer and a vibration pickup. The sound-level meter is the basic instrument of the three since it measures the magnitude of the overall sound pressure level. The other two instruments supplement it. The octave-band analyzer divides the audible frequency range into eight frequency bands between 20 cycles per second and 10,000 cps and provides a reading of the sound pressure level in each of the eight bands. The vibration pickup measures the velocity or displacement of a vibrating surface, which together with the area of the surface, gives a measure of the noise radiated by the surface.

After a preliminary study, it was concluded that the noise in the engine room resulted from the following:

1. Direct noise from the engines.
2. Direct noise from vibrating pipes, plates, etc., which are set into vibration by the engines.
3. Reflected noise from the roof, walls, floor and equipment in the room.
4. Outdoor noise radiating into the engine room from the exhaust mufflers and air intake filters located just outside the building.

The direct noise from the engines had its major sources in the scavenging air pumps, gears, power cylinders, and exhaust system. Noises from these sources increase as the engine speed is increased and as the engine load is increased. A considerable portion of the direct noise was being reflected because of the poor absorbing ability of the materials which comprise the bounding surfaces of the room. Other factors which influenced the amount

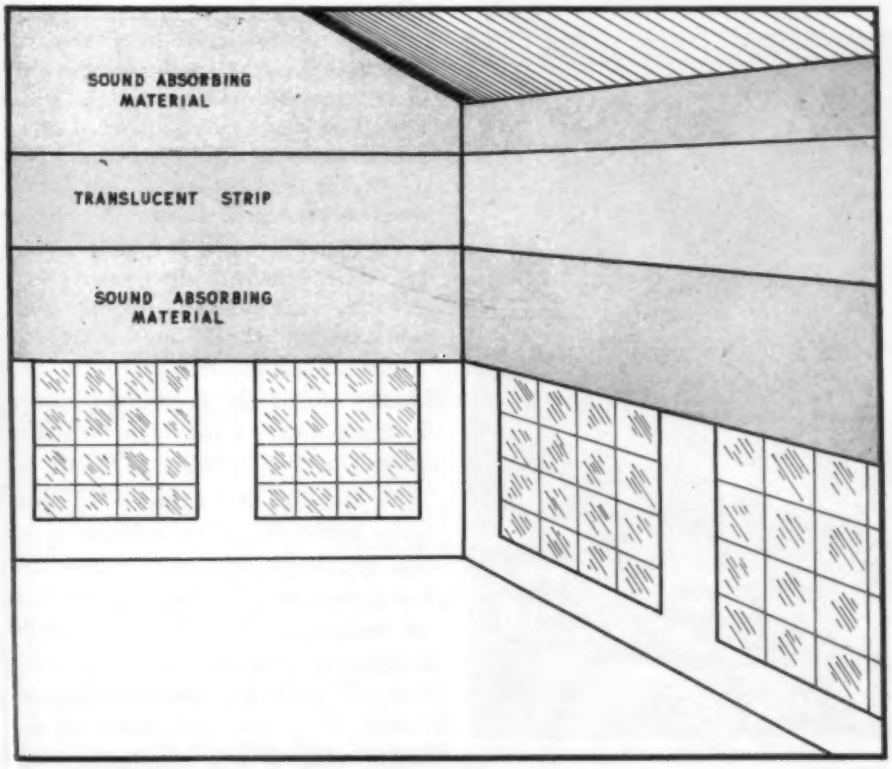


FIGURE 2

SHOWING THE COMPOSITION of the fiber glass blanket material used in this work is C. E. Prewitt, Texas-Illinois station superintendent, and W. T. Cook, South Texas sales representative of Gustin-Bacon Manufacturing Company.

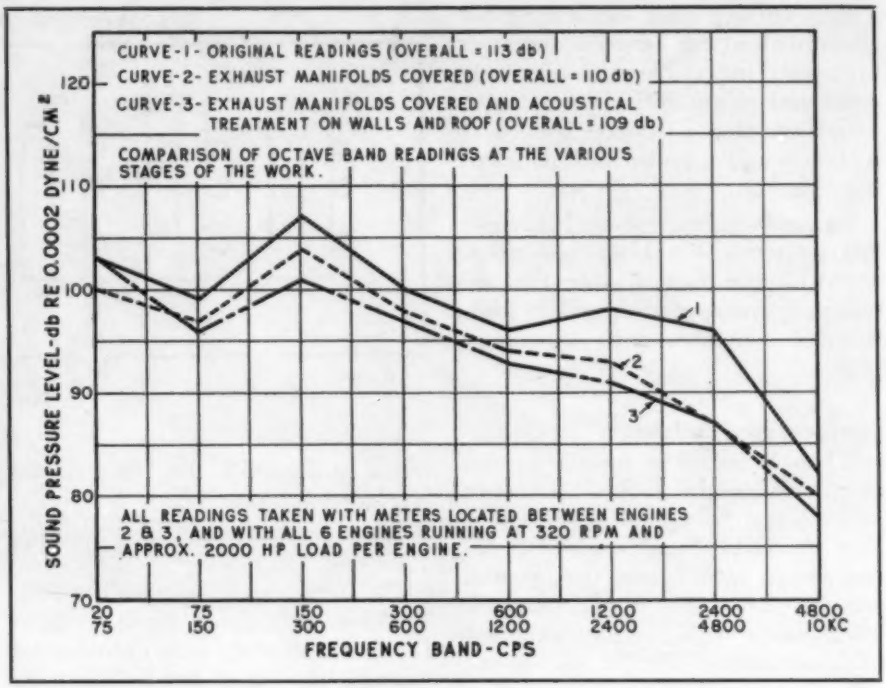

CURVE-1- ORIGINAL READINGS (OVERALL = 113 db)
CURVE-2- EXHAUST MANIFOLDS COVERED (OVERALL = 110 db)
CURVE-3- EXHAUST MANIFOLDS COVERED AND ACOUSTICAL TREATMENT ON WALLS AND ROOF (OVERALL = 109 db)
COMPARISON OF OCTAVE BAND READINGS AT THE VARIOUS STAGES OF THE WORK.
ALL READINGS TAKEN WITH METERS LOCATED BETWEEN ENGINES 2 & 3, AND WITH ALL 6 ENGINES RUNNING AT 320 RPM AND APPROX. 2000 HP LOAD PER ENGINE.
SOUND PRESSURE LEVEL-db RE 0.0002 DYNE/CM²
120
110
100
90
80
70
1
2
3
20 75 150 300 600 1200 2400 4800 10KC
FREQUENCY BAND-CPS

FIGURE 3

of reflection were the rectangular shape of the building and its small size as compared to the size of the equipment it housed.

Final decisions regarding the measures taken to combat the noise were guided not only by the noise reduction obtained, but also by the following factors:

1. Cost as compared with the improvement gained.
2. Interference with good operating practices.
3. The effect on fireproofing.

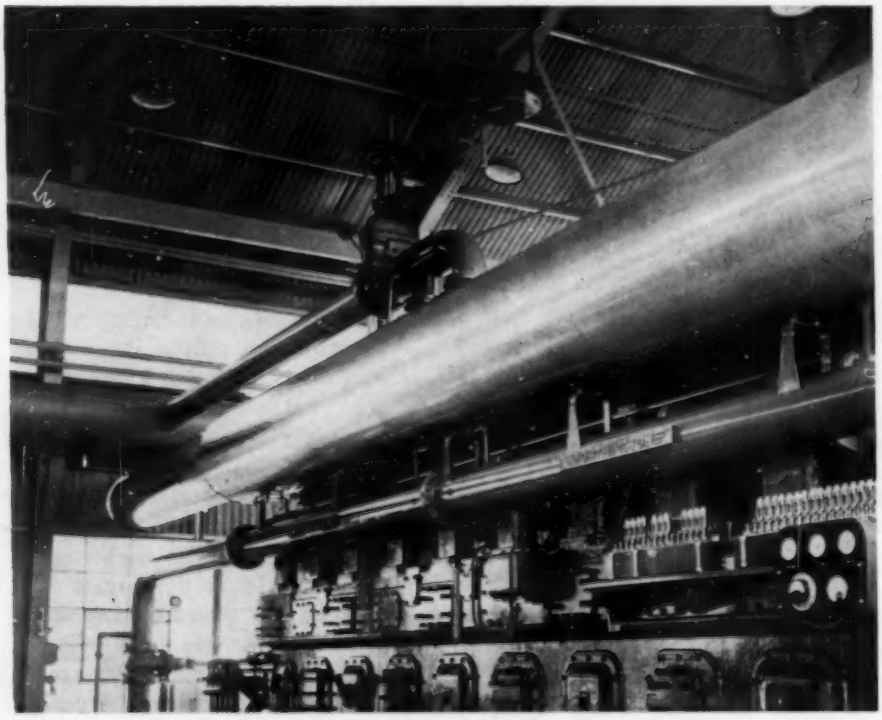
No internal engine changes were made without the approval of the engine manufacturer. At various times during the course of the work, N. L. Meyerson, assistant manager of Research and Development for the Worthington Corporation, gave his assistance to this project.

Engine exhaust insulated. The predominant noise in the engine room was engine exhaust, hence first efforts were directed at this source. A sound absorbing cover was designed for the 27-inch outside diameter water-jacketed exhaust manifolds and exhaust pipe. This cover consisted of a three-inch thick layer of pre-formed glass fiber pipe insulation covered by a jacket of 20-gage sheet aluminum. The improvement resulting from this installation is shown graphically in Figure 3. The readings plotted were taken between engines No. 2 and No. 3. The exact location of the instruments is shown in Figure 1.

(It can be seen that a general improvement was obtained throughout the entire audible frequency spectrum and that the over-all noise level was reduced from 113 db to 110 db. The change of 3 db in the sound pressure level represents a reduction in sound power of 50 percent.)

To the ear, the improvement was quite noticeable. The exhaust noise had not been completely eliminated, but it had been muffled a great deal. In addition, other noises could be heard which had previously been masked by the overpowering exhaust noise.

The cost of this installation was about $650 per engine, and it was



TWENTY-SEVEN INCH EXHAUST MANIFOLD was covered with a three-inch layer of pre-formed pipe insulation topped by a jacket of 20-gage sheet aluminum.

EXTERIOR VIEW high-pressure gas side of Texas-Illinois compressor station near Lufkin, Texas. Building is of corrugated asbestos siding.

considered satisfactory from the standpoints of appearance, operations and cost. All engines at the eight stations in question now have these covers installed.

The covering of other portions of the engines was considered, but experiments proved that partial covers over noisy parts were ineffective and complete covering of noisy parts was too objectionable from an operating standpoint. The experiments also proved that small reductions in the noise level were extremely difficult to detect due to the high degree of reflection present. Because the station had to be kept in almost normal operation, good experimental conditions could be set up only for brief periods.

This led to a decision to reduce the reflected noise by covering the available areas of the interior surfaces of the building with sound absorbing material.

These areas included the entire roof, the space on the side and end walls between the tops of the windows and the bottom of the translucent strip, and the gable ends above the translucent strip. The total area covered was about 12,600 square feet.

The sound absorbing material selected was a glass fiber blanket which is furnished in pieces 4 feet wide, 25 feet long, and 3 inches thick, and consists of two different types of glass fiber materials separated by a central, flexible septum.

This blanket was installed between the roof purlins and between the wall girts.

For the sake of appearance a cover was placed over the glass fiber blanket. The cover used was a perforated, corrugated material made of 24-gage aluminum sheets which were fastened to the purlins and girts.

JACKET FOR EXHAUST PIPING was carried out to the silencer. In addition to reducing noise, the jacket has a good appearance and eliminates need for painting.

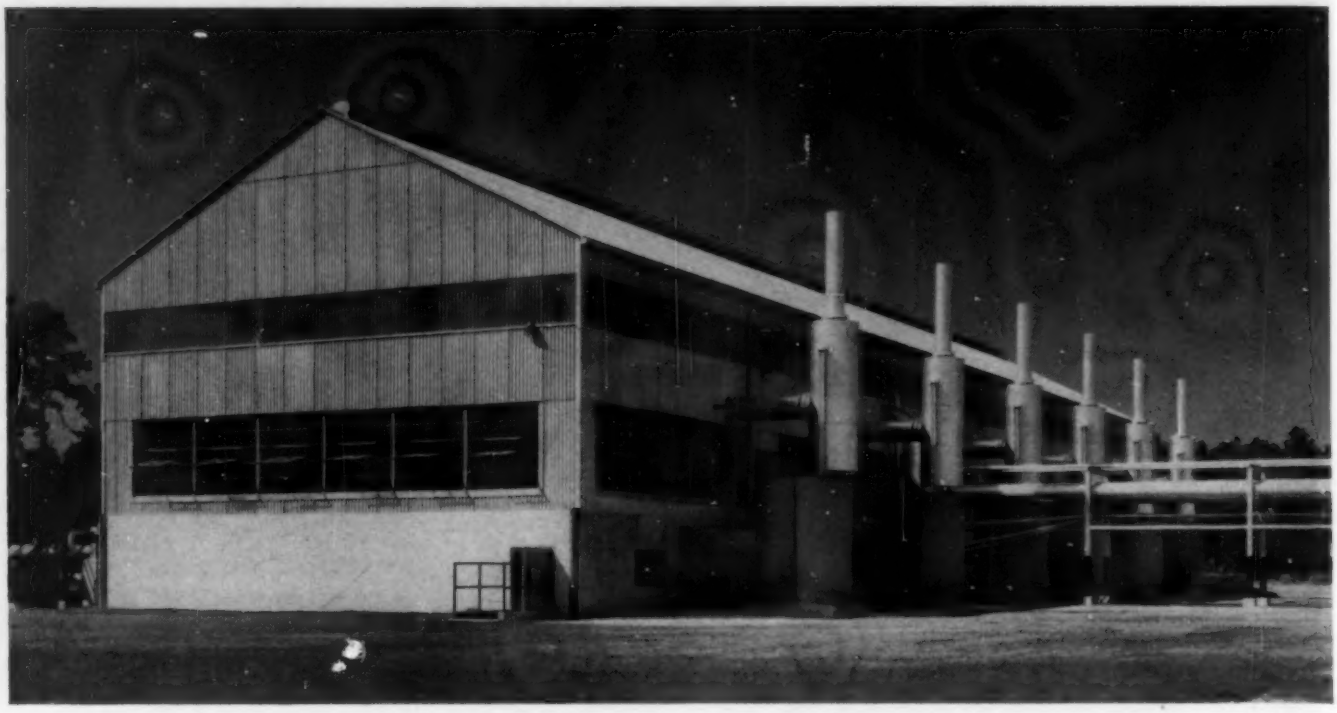
The results obtained with this installation are shown in Figure 3. A general improvement was obtained throughout the audible range except for the 20 to 75 cycle band. Readings in this frequency band were difficult to take due to fluctuation of the meter pointer, and the points plotted for this band represent the best possible average. It is unlikely that the noise level in this band was actually increased as a result of the installation as is indicated in Figure 3.

The over-all noise level was reduced 1 db to 109 db. This small change in the over-all reading was not entirely unexpected. It is known that in a room with high roof, the noise level resulting from the operation of closely spaced engines will not be too greatly affected by placing sound absorbing material on the roof because the direct noise from the engines is the dominant factor. In this instance about 74 percent of the absorbing material was placed on the roof.

Yet despite this small improvement in over-all reading, considerable benefit resulted from the installation. A large decrease in reverberation time and hence reflected noise was obtained.

While this improvement does not lend itself well to a quantitative description, the nature of the effect can be described:

Originally, the noise in the engine room was a confused jumble having no directional quality due to the high reflection. In walking past an engine



SCAVENGING AIR SILENCERS also help control noise at the Lufkin station.

it was difficult to determine by ear whether or not it was running. The noise in the vicinity of an engine which was shut down was about the same as when it was running.

After the sound absorbing material was installed, the noise became highly directional, and individual noises coming from various sources on the engine could be identified. It became noticeably quieter in the vicinity of an engine that was shut down, especially if it was an end engine.

The cost of the installation was about $11,000. While this is somewhat expensive, it was considered satisfactory from the standpoints of effectiveness and appearance. Similar installations are now in the process of being completed at seven other stations.

Conclusion. The net result of insulating exhaust piping and the top portion of the building has been to produce a much improved working environment in the engine rooms. Conversations between operators can be carried on more easily, and the same is true for telephone conversations. Operators are pleased with the improvement.

The question of the desirability of further improvement in the noise level now presents itself. There is currently no widely accepted standard available. Much work toward this goal is in progress by various interested organizations, and when sufficient data has been accumulated, a recommended standard will be published, possibly by the American Standards Association.

Meanwhile, the Texas-Illinois Natural Gas Pipeline Company will continue its efforts to reduce engine room noise by changes involving the scavenging air pumps and gears on the engines and by reducing outdoor noise radiating into the building.

—The End

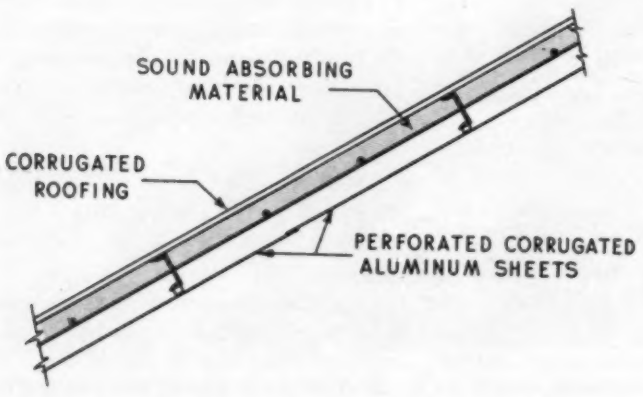


FIGURE 4
Typical Roof Section

About the Author

SEYMOUR LASCOE received his B.S. in electrical engineering from the Illinois Institute of Technology in 1948, at which time he joined the Natural Gas Pipeline Company of America and associated companies. He did electrical design work for the Illinois Natural Gas Pipeline System, and became engaged in noise abatement work in November, 1953. He is a registered professional engineer.

POLYETHYLENE TAPE being applied over ditch by a hand-powered machine which coats pipe at about 400 feet per hour.

Corrosion Survey Saves $26,000 on 30-Mile Line

By WAYNE A. JOHNSON, Corrosion Rectifying Company, Houston

RECENTLY THE Plains Pipe Line Company laid 30 miles of 8-inch diameter pipe in the Lance Creek Field of Eastern Wyoming. The line was urgently needed to complete a tie-in to move the oil south to a main transmission line in the state of Colorado. It was estimated that the line would be in use no more than eight years. The question arose whether or not it would be necessary to dope and wrap the line to prevent excessive underground corrosion for this period of use.

The cost of providing a complete cover of a hot enamel with a wrap of felt was estimated to be about $1000 per mile, or approximately $30,000. As the line was to be laid during the winter months in temperatures as low as 20° below zero, it was felt that it would be difficult to provide a good dope job with the hot applied enamel. Fears were expressed that the enamel would have difficulty in bonding to the pipe, and that it might severely crack in the extremely low temperatures while resting on the skids.

F. M. Coker, construction engineer, decided that the first step should be to determine the relative corrosivity of the soil. A soil resistivity survey was conducted along portions of the line using a Collins type soil resistivity bridge. This is a small battery operated meter which works in conjunction with a "spotting" bar having an insulated tip. The bar is inserted in the soil to pipe depth along the pipe line right-of-way; an electric signal is introduced into the bar and soil resistivity readings are made directly on the meter.

Soil resistivity is an excellent clue as to the relative corrosivity of specific soils. The values appearing on the meter are indicated in ohms per cubic centimeter, relating to the soil lying around the insulated tip of the bar. A good rule to remember concerning soils is this:

Soil Resistance	Remarks
Less than 1000 ohms per cubic centimeter	Always very corrosive
1000 ohms to 10,000 ohms	Varies from mildly corrosive to very corrosive
Over 10,000 ohms/ cubic centimeter	Rarely corrosive

It was found that the soil resistivities in the low areas, i.e., creek beds, valleys, etc. were comparatively low, varying from 1300 ohms per cubic centimeter to 3000 ohms per cubic centimeter. Resistivity values on the hillsides where very little moisture was able to accumulate were of the order of 5000 ohms to 50,000 ohms. The low areas represented approximately one-thirtieth of the length of the line, or a total of about a mile of pipe.

Thought was given to the use of hot enamel coatings only at the "hot spot" areas but was discarded for the previously mentioned reasons. Complete cathodic protection of the low or "hot spot" (i.e., corrosive) areas was considered, but was felt somewhat costly for so much bare pipe involved. It was decided that a combination of a coating on the "hot spot" sections with a minimum amount of cathodic protection would be the best solution.

A polyethylene type tape presently available offered the solution to the particular need. This tape is available in widths from 1 to 8 inches, with an over-all thickness of 12 mils. Four mils of the thickness is an adhesive mass; the remaining 8 mils is a polyethylene film.

This use of this tape coating was of special nature, being resorted to due to several factors in its favor. A preliminary study of the various factors involved should be made before applying this type protective coating over great lengths of line, in preference to the more commonly used hot asphalt and coal tar coatings. However, this tape has several important features favoring its use:

- Ease of application
- Total cost of applying tape is competitive with other types of coatings
- Extremely high di-electric strength (resistance to corrosion)
- Impervious to acids, alkalies, etc.

In this particular case it is felt that the objective, to protect the line for an approximate eight-year period, was obtained. Moreover, it was obtained at a considerable dollars and cents savings. The cost of the polyethylene tape plus the cost of applying it, with the application of a few magnesium anodes, was only $4000. Thus, the savings was considerable.

—The End

Executives are receiving more and more requests for interviews. Here are six suggestions on . . .

How to Be Interviewed

By AUREN URIS, Research Institute of America, New York

MORE AND MORE executives are being tagged for interviews. Newspaper reporters, writers in the management field, opinion seekers of every shade and caliber, are knocking at office doors across the continent.

How well are executives coming off in these face-to-face meetings?

Without violating any confidences, it can be said right here and now, that for some of the interviewed, as well as the interviewers, the efforts are a waste of time.

Day vs. Night—Executives, hotshots in their jobs, aggressively able to meet every demand and crisis of their daily routine, performed miserably in some cases. Here are two contrasts:

"Mr. Knite," top executive of a large refining operation, comes face to face with a writer who wants to get his views on qualifications of today's executives. Mr. Knite, who has dealt with the problem intelligently for years, finds himself freezing up.

Of course, it's not the poised pencil. Mr. Knite is simply unfamiliar with the role he's supposed to play in the interview situation. He lacks knowledge of the few essentials he must have to prepare properly for it.

Result? The interviewer leaves, no smarter than when he came. His only gain is a doubt as to Mr. Knite's qualifications for his job.

Mr. Knite's feelings of frustration and annoyance need no detailing here.

Happily, the interviewer's next call is on "Mr. Daye," who proves to be more experienced. The encounter is much more fruitful. The interviewer leaves with a notebook crammed with useful information and the opinion that Mr. Daye is very much on the ball.

Yet, the plain fact is, very little difference exists between Mr. Knite's and Mr. Daye's knowledge of the subject.

It's Not What You Know . . .

. . . but what you can get across to the interviewer that makes the difference. It's largely Mr. Daye's ability to handle himself in the interviewing situation that has made it possible for him to come off so well.

How to Prepare—Here are six recommendations that can help you hold up your end of an interview satisfactorily. Chances are you're familiar with most of them. On the other hand, checking your practices against these suggested steps may help you refine your procedure, make your interviews even more successful.

Remember, too, that you can learn something in the course of the interview—if you know the right questions to ask.

1. Find out what the interview is all about.

Generally, the interview may be set up either by letter or phone. Whether by the written or spoken word, you should learn the answers in advance of these questions:

- What's the subject up for discussion? It may be executive training, your opinion as to how business prospects are shaping up, or your views on interplanetary travel.

Whatever it is, you should get the writer to spell it out for you. And don't hesitate to keep on asking questions until he's cleared up your doubts. If he says he wants to get your views on public relations, query him further. Is it the subject of public relations in general that he's interested in? Or is it actually your company's public relations policies he wants to hear about?

- What's his focus? If your statement is simply going to turn up as an item in a statistical table, part of an industry-wide survey, for example, you can be pretty sure the interview will be pretty much a streamlined affair. But if what you give out is going to be featured, your slant on the subject may have to be considerably broader.

Types of Interviews—Generally, interviewers use two possible approaches:

. . . The "closed" interview. Here he's after specific information on a specific subject. He can tell you, "Mr. Jones, my publication is conducting a study to assess the labor needs in this area within the next year." Here—if you like—you can give him the facts, or your assumptions, on the clear-cut track he's set up. His questions will be simple and to the point:

How many people do you have on your payroll now?

Within the next six months, do you expect to have more than the usual number of severances?

Within the next six months, do you expect to be hiring more than the usual number of personnel? And so on.

. . . The "open" interview. The *objectives* of this type of interview may be just as clearcut. But what remains very much in doubt is the *subject matter* of the interview. Here are some interview subjects of the "open" variety: your views on executive leadership; your views on the best ways to motivate people; your views on the critical areas in management today.

The "open" interview is somewhat like a fishing expedition. All the writer knows is the broad outline of his search. He depends on you to lay down the track, the development of the idea or information. To this end, his questions may run something like this:

"Mr. Smith, what's your opinion of the caliber of executive leadership today?"

"Do you think it's improving or growing worse?"

"Why do you think so?"

"Can you give me any examples?"

And so on.

When the interviewer has finished, he probably has a pretty good idea of your views on a *dozen* subjects. But included among those—if he knows his job—is the one he's after.

2. How much time will he need?

It's a simple point, but failure to clear up the time question can lead to mutual disappointment or aggravation.

One well-known magazine reporter recently traveled from Chicago to the West Coast to get the opinion of an industrialist on a series of current topics. The writer had expected to have a full day of the executive's time. The industrialist, not knowing the traveling entailed, had assumed an hour would be adequate!

It's easy enough to ask the interviewer how long he expects the interview to take. The experienced man can usually tell within minutes how long he'll need. This information prevents you from trying to cover a two-hour subject in 15 minutes and keep him from trying to stretch what is to

your view a 15-minute break into a two-hour discussion.

3. Ask how the material is going to be used.

This question can be a "tip-off" on several important points:

- Does he want to quote you directly? If he does, you may want to get clearance. In addition, his use of the material may very well temper what you say. You might express an opinion for his background information, and not to be used directly, that you wouldn't want to see in print.
- Does he want to use your company affiliation? If it's desired that your company's or organization's name be coupled with yours, again, the question of clearance may arise. Getting the matter cleared up in advance will put you on much firmer ground.

4. Should you "prepare"?

The answer is both yes and no. An interviewer has sometimes crossed an office threshold to come across the startling sight of a prepared executive, surrounded by piles of technical books, files, reports, and so on.

In the average case, such voluminous documentation is unnecessary. Generally, the interviewer wants your personal views. The kind of information he can get from reference sources he'll probably be primed on before he comes to see you.

However, where you want to refer to specific data, it's perfectly O. K. to send this along after the interview. This will conserve time—his and yours.

The matter of prepared notes is another matter, however. Let's say your public relations department has set up an interview; subject, the development your company has been making in a particular area.

Since you know the ground to be covered, there's no reason why you shouldn't have a brief outline, hitting the highlights of the story you want to tell. Your interviewer will thank you for such consideration.

Of course, in the general press interview, where you're making a more or less detailed statement, possibly embodying a formal company policy, it's usual to follow any verbal statement by written coverage in the form of a press release.

5. Should you make it a one-man show?

Executives sometimes ponder the wisdom of having one or more assistants present during an interview. Some executives have found a good deal of stimulation value for their subordinates in such interviews.

As a rule, you can be pretty sure that as far as the interviewer is concerned, their presence will be perfectly all right. He won't know—and won't care—whether they're present to back you up, or merely for purposes of executive education. After all, he's there to get information. And whatever means you use to marshal it for him makes little difference.

6. Should you ask to see copy in advance of publication?

It's a wise precaution if you're at all in doubt, or concerned with the outcome of the interview.

You may find your interviewer not too happy with such a request, particularly when he's working against short deadlines—usually the case with newspaper staff interviewers. Yet even here, if there's a question of the exact wording which will be given to your statements, you may ask to have key paragraphs read to you over the phone, once copy is in final form. In other cases, it's usually practical for you to get galley proofs with the material attributed to you marked off for your attention.

Pumping the Interviewer—Members of working press, by the very nature of their activities, tend to become pools of information on the subjects they're covering. Usually, there's no reason for you not to tap this rich source. Ask the questions that may come naturally to mind in the course of his questioning.

You may not find *his* opinion on a subject that is your specialty of interest. But often, you're one of a group of experts he's querying, and you may find it opportune to ask him about other views. He may or may not be free to name his sources. But if he asks, "Mr. White, what's your opinion of the XYZ situation?" you may very well tell him, then ask, "How does that compare with other opinions you have gotten on that point?"

Big Time-and-Face Saver—Experienced interviewers will tell you: a lot of time and embarrassment would be saved if executives unhesitatingly confess ignorance where it exists. Of course, it isn't too easy. There's the feeling that you're being interviewed simply because you do have the answers.

To some extent we fear being in the shoes of the student who writes across his exam paper, "God only knows the answer to this question,"; and gets the reply, "God gets an A, you get an F."

In the average interview, you're "marked" only by what you say. And, "I don't know" is frequently the height of truth and wisdom. **The End**

Good Old Days? The first sideboom tractors used on pipe lines looked like this 30-horsepower model Fordson with a rigid sideboom. Even the smallest crawler-type tractor built today has more horsepower. The weights, right, were used to counter-balance any load picked up by the boom. Picture was taken around 1928.

LARGO CANYON COMPRESSOR STATION lies in some of the most rugged country of the San Juan Basin. The building houses four automatically run compressor engines, each rated at 550 horsepower. This is El Paso Natural's largest of several portable compressors in the area.

Nobody lives at

El Paso's Unattended Station

This four-engine reciprocating station, complete with dehydration plant, operates on its own 24 hours a day and 45 miles from the nearest road.

By FRANK J. MANGAN, El Paso Natural Gas Company

Forty-five spectacular miles from the nearest paved road in New Mexico's San Juan Basin, one of the natural gas industry's loneliest compressor stations operates unattended on a 24-hour-a-day basis.

Located in rugged, jeep-killing Largo Canyon, the station is operated by El Paso Natural Gas Company. It is the company's largest portable-type compressor station, and it was set up to give needed pressure to gas traveling from the Pictured Cliff wells through the company's gathering system to its Blanco treating plant, near Farmington.

Largo Canyon compressor station originally was placed in operation with two engines in the spring of 1953. As the need for more compression arose later in the year, another unit was added. In September, 1954, a fourth was placed in operation—giving the station adequate power for handling gas from 40 or 50 wells in the area. Each of these engines is rated at 550 horsepower at sea level. However, the station's elevation of 6500 feet scales back the horsepower of each unit to 423.

The station normally is inspected by an operator once a day, but during the severe San Juan winters there are times when it is not visited for several days. Conditions of the roads the operator has to travel during winter months make wartime jeep trails look like present-day turnpikes in comparison. High bluffs, lots of quicksand, rivers and washes, rain, and deep snow drifts make the roads into Largo Canyon almost impassable much of the time. However, even when no daily check has been made, the station has operated very efficiently.

Until this fall, the compressor units were merely mounted on concrete mats and had only an overhead shed of corrugated sheet metal for protection against the elements. Recently, however, the station has undergone a complete redesign.

A floor was poured around the mats and a permanent building was installed. All buried piping was raised above ground. To simplify the starting air system, the air compressors were moved to a nearby structure adjoining the compressor building. These units were installed to operate in parallel, thus giving an ample supply of starting air when needed. The extremely low temperatures during winter necessitates a large amount of starting air to turn over the units.

In the past, when any night work had to be done at the station, a truck-mounted portable power plant was

used. In the recent redesign of the installation a small 3.5 KW gasoline engine electric plant was installed in a separate shed. The compressor building was wired for the necessary receptacle boxes and lighting facilities are available for any night repairs.

Automatic Controls. For a portable compressor station of this sort, a number of automatic controls are indispensable for safe and effective operation. An automatic pressure controller is installed on the inlet station suction header which regulates the speed of engines. If, for example, the suction pressure should suddenly decrease, this instrument would send out a pressurized signal to the governor on each engine to slow it down. Conversely, if the suction pressure should increase, the engines would automatically speed up.

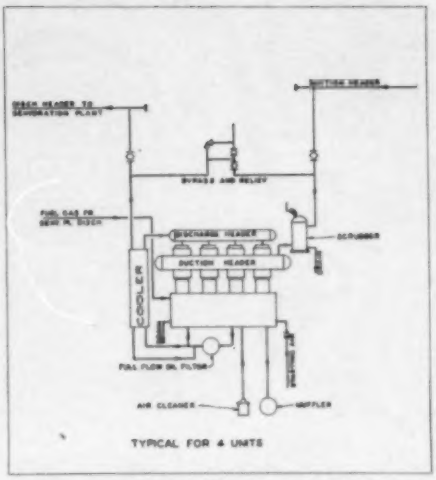
As a safety measure, the station has an automatic control which can be activated by three different situations. This control acts immediately when an overspeed of the engine is detected. Its action grounds out the magnetos and stops the engine. If either the circulating jacket water temperature is too high or the lube oil pressure should get too low, this safety control will also react at once and ground out the magnetos.

In the event of discharge pressure at Largo becoming too high, the station is equipped with a mercoid pressure switch on the discharge side which will completely shut down the units. When this happens, an operator must travel to the station and start the compressors manually, as there are no provisions for starting automatically.

As a regulation on each unit, there are four clearance bottle connections with three-step free air unloaders which are connected to an automatic speed and pressure regulator. The unloading of the cylinders is accomplished by automatically lifting the suction valves on one end of three cylinders of each unit.

Compressor Engines. The compressor units themselves are four cycle, single stage engines. Each has ten power cylinders with an 11¾-inch x 12¾-inch stroke. Each unit has four compressor cylinders—with cast iron liners and micarta rings. These cylinders have a 5¾-inch x 12-inch stroke.

The units are designed to handle a



COMPRESSOR FLOW DIAGRAM

suction pressure of 200 pounds per square inch gage and a discharge of 600 psig. At these conditions, each has an actual delivery of 6.2 M^3CF/D at 14.9 psia and 60 pounds per square inch absolute.

For cooling jacket water and lubricating oil, these units have a closed cooling system equipped with a radiator. The radiator itself is cooled by a large fan driven by V-belts from a sheave mounted on a stub shaft on the engine crank shaft. Jacket water from the engine is directed by a temperature control and a three-way valve through the radiator or the bypass. This automatically maintains proper engine jacket temperature. Water circulation is provided by a small pump driven from the engine.

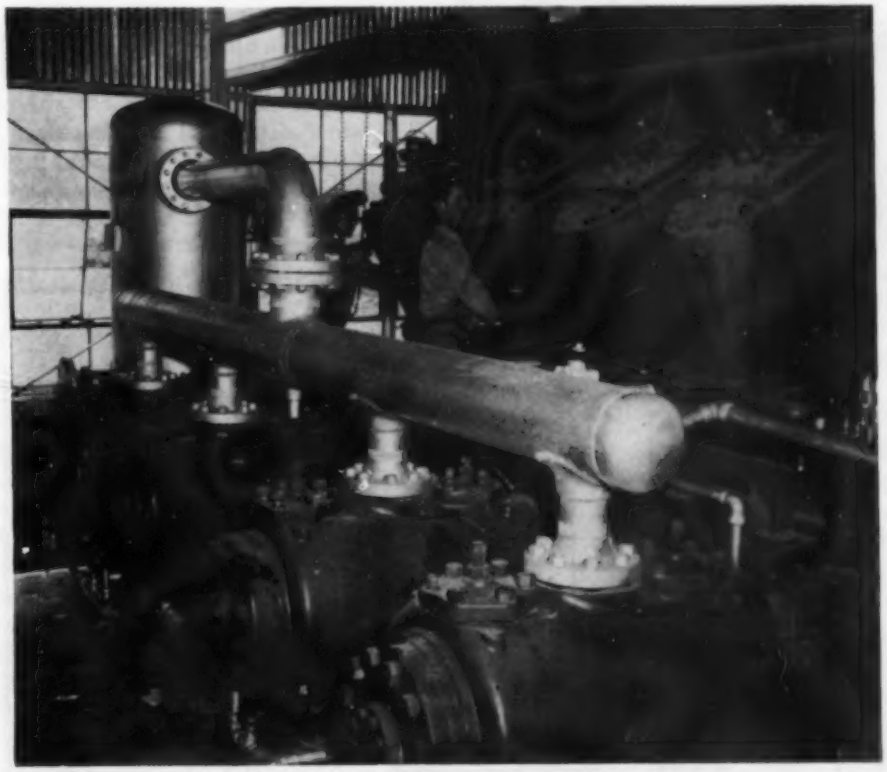
The cooling system is filled with treated water, and during winter months antifreeze is added as a precautionary measure.

Lubricating oil is circulated through the lube oil cooling section in the radiator by means of a built-in rotary type oil pump. A thermostatically operated bypass valve is also provided to insure proper oil temperature to the engine.

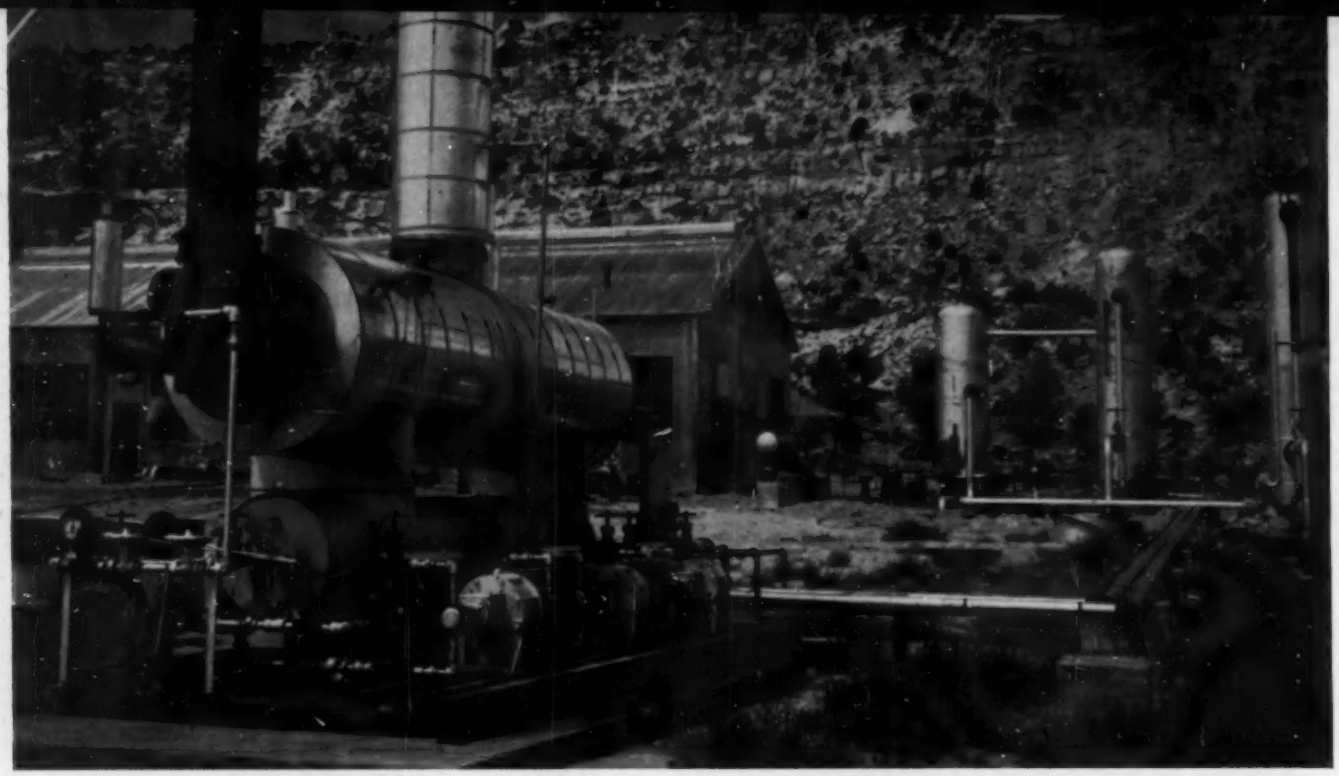
For gas cooling, coils are mounted in the radiator. These are complete with inlet and discharge headers and connection piping from the discharge manifold. The coils are capable of cooling the discharge gas to 120° F. based on 60° F. intake gas to the first stage suction and 95° ambient air temperature.

Dehydration Plant. Because of the extreme temperature ranges in the San Juan Basin, El Paso Natural Gas Company found it necessary to install a dehydration plant on the discharge side of Largo Canyon compressor station.

The purpose of this plant, of course,



INSIDE THE COMPRESSOR BUILDING DURING CONSTRUCTION. Making some of the final adjustments here are R. E. Lee, left, and Roy Gorblet of El Paso Natural. The four 555-horsepower engines are completely unattended except for visits from a service man.



DEHYDRATION PLANT CLOSE-UP. This unit, like the compressors and vessels, can be easily moved to other locations when their services are no longer needed.

is to prevent hydrate formation in the pipe line by dehydrating the gas so that the dew point is lower than any expected pipe temperature. The plant is designed to dehydrate 40 M²CF/D at 500 psig.

As the high-pressure, wet-discharge gas leaves the compressor units, it enters an inlet dehydration scrubber before going to the two dehydration contactors. One of the contactors has a scrubber section installed at the bottom where the gas enters. The inlet dehydration scrubber and the scrubber section of one of the contactors has manually-operated valves to drain off any liquid which may be removed from the gas at these points.

Gas is dehydrated by passing up through four bubble trays in each contactor, counter-current to a triethylene glycol solution which is flowing downward. This dehydrated gas then passes on into the pipe line for delivery to the Blanco plant, about 20 miles away.

In each contactor, the glycol level is maintained by a level control and a corresponding level control valve. The water-rich glycol from each contactor passes through a filter and then goes through a coil in the combination storage tank and heat exchanger. After leaving the heat exchanger, it is fed to the still column which is attached to the top of the reboiler. Some water is removed as the glycol flows down through the still column and the remaining water is vaporized in the reboiler where the glycol is heated to 350°.

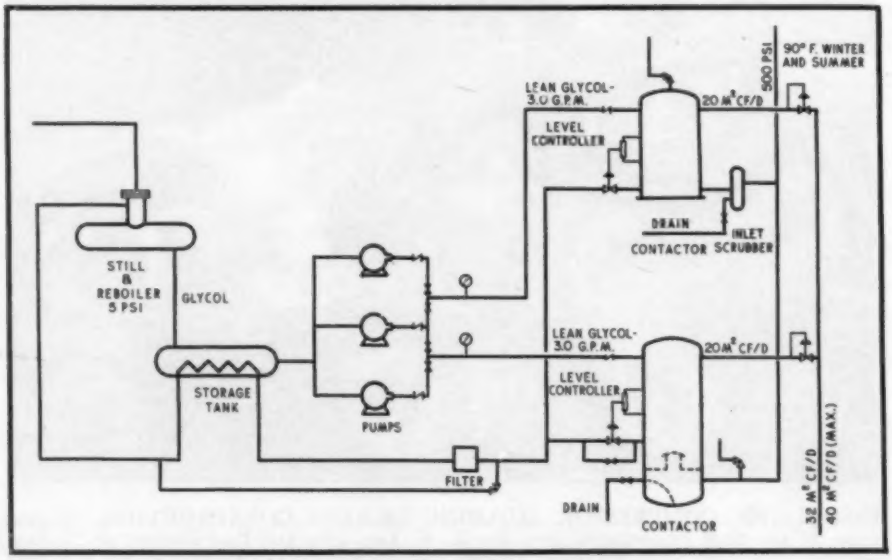
This vaporized water from the reboiler and still is vented to the atmosphere from the top of the still. That hot glycol, which has been concentrated to 97° in the reboiler then flows to the shell side of the combination storage tank-heat exchangers.

Flowing through the heat exchanger, the lean (97 percent glycol) is cooled to 246°. This glycol then flows from the heat exchanger to the suction of the pumps. The pumps increase the pressure of the lean glycol to about 500 psig, so that it can flow into the top of the contactors to repeat the dehydration cycle.

All fuel requirements are taken from the discharge side of the dehydrator plant, passed through a heater and regulated to required pressures.

Portable compressor stations like the one at Largo Canyon have proven their worth in many ways: they can be moved easily from one location to another if the need arises, they are economical in operation. They're the midgets of the compressor business, but they do a mighty big job.

—**The End**



SCHEMATIC OF DEHYDRATION SYSTEM.

You Asked About Corrosion . . .

MARSHALL E. PARKER

• How may coke breeze backfill be properly compacted around a graphite anode in water-filled hole?

By MARSHALL E. PARKER, Consulting Corrosion Engineer

Q.—How may coke breeze backfill be properly compacted around a graphite anode in a water-filled hole? How important is it that a well-tamped backfill be obtained under such conditions? L. E. W.

A.—To answer the second question first, it is always important that a well-tamped backfill of coke breeze be obtained around a graphite anode, unless the current discharged is very low; the manufacturers recommend a maximum of 4.0 amperes for a 3-inch times 60-inch anode in well-compacted backfill, and 1.0 ampere for a bare anode. The graphite is subjected to electrolytic attack if the current discharge takes place directly from its surface to the soil or water; with coke breeze, the actual anode is the coke, the graphite serving solely as a connecting terminal.

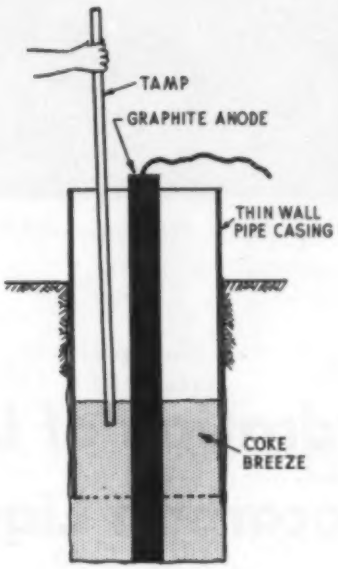
The coke breeze serves two purposes:

• It reduces the total resistance of the anode, by increasing its effective diameter; this is not so important as it seems at first glance, for the resistance ratio of two anodes with an 8:1 diameter ratio is only about 1:0.7.

• It absorbs the electrolytic attack; this is of primary importance, for an anode installed with soil and water admixed with the backfill may fail in one or two years, as compared with 15 to 20 years of anticipated service.

Coke breeze cannot be adequately tamped in a hole which contains standing water; either a temporary or a permanent casing of some sort must be installed. A permanent casing can be a sleeve or pipe of any available material, as thin as can be handled; if the lined hole can be pumped dry, the coke can then be tamped, and the casing left in place. It will, of course, be consumed electrolytically, but this is of no consequence. A temporary casing is usually of heavier pipe, and is withdrawn gradually as the coke breeze is tamped below its lower edge. It is important to raise it at such a rate that there is never any significant amount of tamped backfill within it; otherwise the bridging action of the coke breeze is such that it is likely to come up with the casing. One or the other of these devices must be used if the soil is quicksand or some other caving formation; if water alone is the only problem, pumping may suffice to remove it.

A recent development offers considerable promise for a satisfactory solution of these difficult conditions. Anodes of high silicon cast iron seem to be capable of discharging quite heavy current densities without backfill and without significant attack. These are available in 1½-inch times 60-inch and 2-inch times 60-inch sizes, and several installations have been made in which the anodes were simply pushed into quicksand or marshy soil, without any backfill whatsoever. The average resistance to earth of a single anode of this type is about three-fourths of that of a 3-inch times 60-inch graphite anode in a 12-inch diameter coke breeze backfill; interference effects are comparable, so for a given total ground bed resistance, about twice the number of bare Duriron anodes are required. When consideration is given to the savings in installation costs, and to the high freight charges on backfill, such ground beds are often comparable in cost. The immunity to destruction then remains as an advantage.



It should be emphasized that these properties of the high silicon anodes are, at present, problematical; that is, they have not been firmly established by field tests. Laboratory tests, however, make them seem highly probable, and it is believed that the potential advantages—compared with the demonstrated deficiencies of the older types of anodes under difficult conditions—qualify them as an excellent risk for any company willing to incur some hazard for the sake of advancing the progress of cathodic protection. **—The End**

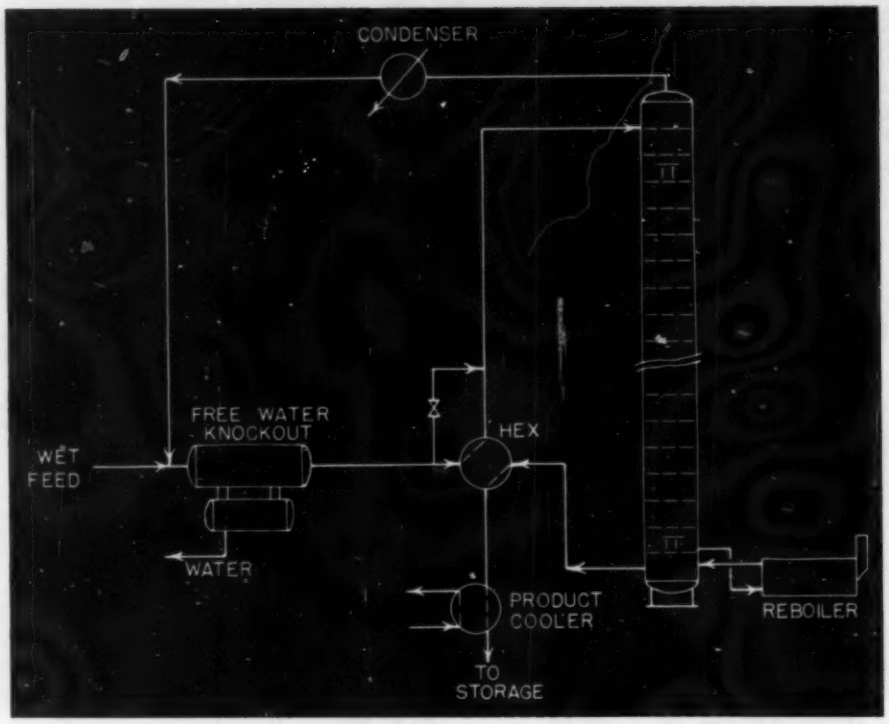


Fig. 8—Flow diagram for a distillation drier.

Dehydration of Light Hydrocarbon Liquids

Part 1: Dehydration methods

Part 2: Regeneration methods and design factors

Part 3: Distillation drying and testing for water

By JOHN M. CAMPBELL, Assistant Professor Petroleum Engineering, University of Oklahoma, Norman, Okla.

Distillation Drying. The use of distillation to dry light hydrocarbon liquids is not nearly so prevalent as the use of dry desiccant but warrants some discussion because of the lower investment and operating costs inherent in the process. It does, however, have certain practical limitations. First, the feed to the tower must have substantially unvarying composition in order that the tower might be properly adjusted and operate properly. If fluids with widely varying properties were fed to the tower, it would be necessary to make a readjustment every time such change occurred, in order to obtain the proper fractionation. Reasonably small fluid changes are tolerable but the use of such a process on product pipe lines is subject to some serious question.

Second, the water content of the feed must be limited to that which may be carried out overhead at the top column conditions. The column in question is simply a stripping column and therefore water which does not go out overhead must of necessity go out through the reboiler with the hydrocarbon liquid, unless a secondary drawoff is provided. Therefore the water content of the overhead gas at its dewpoint times the volume represents the total amount of water that may be removed. This is to say basically that large quantities of free water cannot be tolerated in the entrance feed.

The third and possibly the most series limitation is in the degree dehydration provided. In the average case the exit water content from such a unit is usually not less than 15 parts per million by weight, as determined by actual operating experience. Lower values have been obtained but the above figure represents a practical minimum for many fluids.

Flow Diagram. Figure 8 is representative of the flow diagram of a typical distillation drying system. The wet feed enters the free water knockout after which the hydrocarbon is preheated by the bottom product before entering at or near the top tray of the column. The bulk of the water is removed with the overhead hydrocarbon vapors, which are condensed and returned to the wet feed stream. The free water formed on condensation is removed in the primary free water knockout. The dry fluid emanating from the bottom of the tower is partially cooled in the feed heater before going to the final product cooler and storage.

In some cases it is felt desirable to add a second free water knockout on the overhead gas line, returning the hydrocarbon overhead from that vessel into the wet feed line. However, this obviously entails some additional investment.

Comparison of this flow diagram with Figures 3, 4, and 5 (see Part 1)

Part 3

illustrates the simplicity of the process and the reason for the lower investment cost.

Design Factors. As in all fractionation processes, it is necessary to have, or be able to predict, the vapor equilibrium relationships. Experience has shown that the assumption of ideal solutions gives excellent results in the region where gas and hydrocarbon-rich liquid are the only phases present.[23]

For a given feed, the over-all material balance is fixed by the desired bottom product. Since this determines the overhead composition, it is then necessary to fix pressure and top temperature so that the dewpoint composition is such that the proper amount of water may be removed at that point. A bubble point calculation on the bottom product will then give that temperature.

By means of material and energy balances, together with standard fractionation calculations, an estimate of conditions in the column may then be fixed. It is usually felt desirable to add 25 percent to the theoretical reboiler load to account for heat losses in the system and any fundamental errors in the data used.

The diameter of the column is normally governed by the liquid load. When sizing on such a basis it is customary to use an allowable liquid velocity of .4 to .6 feet per second in the downcomer, with the downcomer area being 15-20 percent of the total tower cross-section. Once the tower diameter is fixed by this means, it should be checked for gas load as a safety precaution.

It is advisable in any case to install a chimney tray several trays below the feed point to prevent any free water from carrying over into the bottom of the tower. This tray, when equipped with a water draw-off pot, serves as a safety device in the event that the free water knockout carries over.

Any one of the several calculation methods for binary mixtures may be used in making the fractionator calculations. The most convenient method is to use the classic McCabe-Thiele graphical method. However, since the water concentrations are very small it is virtually impossible to represent the Y-X coordinates on rectangular graph paper. Therefore, it is customary to plot these coordinates on logarithmic paper, which in effect magnifies the divisions. On this type of plot, the equilibrium curve is substantially a straight line, whereas the operating line is curved.[23]

The calculations for light hydrocarbon liquids show that only one to two theoretical trays are normally required. However, experience has shown that the overall plate deficiency is very low. Values of 5½ percent are reported for hexane,[9] while 7 percent may be used for butane. This experience confirms the hypothesis that plate efficiency is inversely proportional to the relative volatility of the components. As a general rule, 24-28 actual plates are necessary to give dehydration comparable to dry desiccant.

Tray spacing of not less than 20 inches is advisable when using bubble caps, which makes the average tower about 50 feet high.

Testing for Water Content. Regardless of the dehydration process used, it is necessary to have some means of testing the water content of the fluid. Unfortunately, most of the accurate means of measuring water content involve chemical reaction and are best carried out in the laboratory. The available methods of testing for water content may be briefly summarized as follows:

1. **Karl Fischer Reagent**—This is the most common of today's methods and involves a titration of the water-oil solution with a mixture of iodine and sulphur dioxide in a methanol pyridine solution. At the end point, the characteristic purple color turns to yellow. Since this color change is often masked by the hydrocarbon color itself, potentiometric titration is often used. This system has been previously described.[23] Unfortunately, Karl Fischer Reagent is very unstable and must be protected from light if kept over several days.

2. **Smith-Bryant Method**—This is based on the quantitative liberation of two mols of acetic acid by reaction of water and acetyl chloride in the presence of pyridine. The acetic acid is then titrated with standard sodium hydroxide solution.

3. **Absorption in U-tubes**—Known quantities of liquid may be passed through a given quantity of carefully regenerated fresh desiccant. The amount of liquid adsorbed is then determined by weight after running a blank with the same liquid, specially dried.

4. **Cobalt Bromide Test**—This is the standard NGAA method of testing for dryness. Propane vapor is passed through a porous cotton plug impregnated with Cobaltous Bromide and the propane is judged wet if the original blue or green color turns to lavender or pink during the test. Some operators have expressed dissatisfaction with this method because propane tanks consistently testing dry sometimes have shown large quantities of free water.

5. **Expansion Tests**—With propane and butane it is possible to expand the liquid from storage through a small needle valve into a very small vessel with a thermometer inserted so that the gas formed impinges on the mercury bulb. A thin wire is extended from the nipple from which the propane drips. The temperature at which flow stops represents the cloud point. This method, although relatively crude is used by some operators as a practical test of liquid dryness.

The above resume of light hydrocarbon liquid drying, though not complete, summarizes the basic principles and factors involved in such a process. Like many processes which are basically simple their success depends on attention to the small details, particularly because the quantities involved are very small. These processes, particularly dry desiccant dehydration, have proven very satisfactory and may be used with confidence.

EDITOR'S NOTE

A complete bibliography appeared with Part 1 of this article. See Page 54, October, 1954, PIPE LINE INDUSTRY.

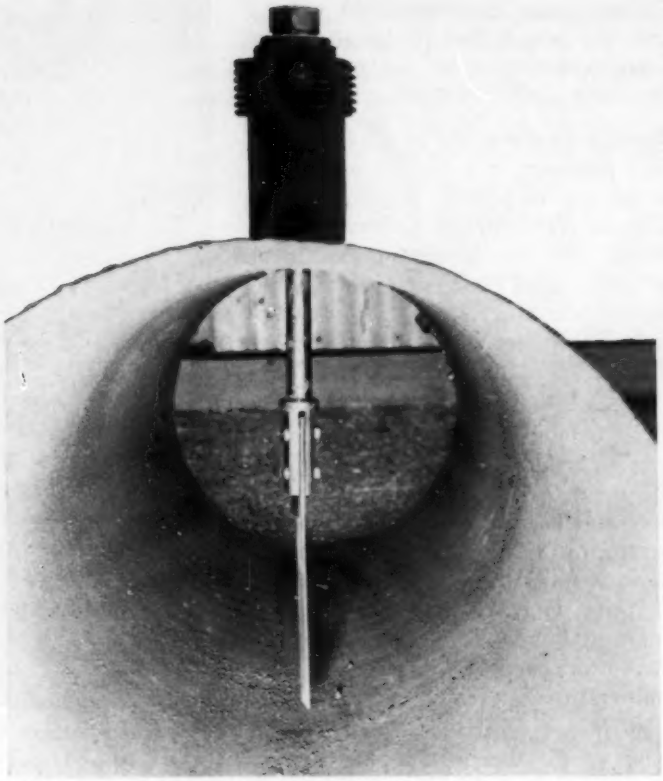
—**The End**

gadget on a pipe line . . .

'Scotch' Nipple

. . . *for internal corrosion studies*

It affords a means of inserting a coupon in a line under pressure for corrosion studies.



PICTURE ABOVE illustrates how special nipple is used to install or remove corrosion test coupons from lines.

A SMALL PIPE line appurtenance appropriately known as a "Scotch nipple" is lending a big hand to United Gas Pipe Line Company corrosion engineers in their continuing efforts to find exact causes of internal corrosion in natural gas pipe lines and determine the effectiveness of remedial measures to control it.

Corrosion in any form is an arch enemy of the pipe line company, but it can become especially elusive and troublesome when occuring inside the lines where it cannot be seen. There, in relative security, it can eat away at the inner wall of the steel pipe until serious and permanent damage results.

What makes it break out at one location in a line, and be negligible a few miles down the same pipe line? Why does it become serious and costly in one area and not in another?

To provide specific information on these and other questions—information that is hoped will establish a pattern of internal corrosion occurence—United engineers are now engaged in a broad study of what goes on inside pipe lines in the Carthage gas field of East Texas. From the results it will be the aim of research and corrosion personnel to develop methods of counter-action that will not only prove effective but at the same time be justifiable from a cost standpoint.

The Scotch nipple, with its internal plug seal, is the device which enables them to make their various tests and observations under actual operating and pressure conditions. As illustrated here, it is a special attachment on top of the pipe line through which testing equipment can be inserted and removed without taking a line out of service. The name "Scotch" merely implies its economical advantage over other methods which would involve

PICTURES BELOW and on opposite page show how Scotch nipple is being utilized by corrosion engineers in Carthage field area. Pictured are J. W. Graves and M. C. Deodati, Jr. of general office Corrosion section; B. D. Rowland of Research department; and E. L. Bailey, Jr., maintenance man at Carthage. Below left shows how nipple appears in "bell hole." Center, the lubricator, a device used to make entry into the line under pressure, is screwed into a valve on the nipple; and at right, the valve is opened.

TURNING HANDLE of lubricator, left, to unscrew the internal plug seal in Scotch nipple. After valve is closed and pressure released from lubricator, it is removed, center, and a water sampling device attached. Lubricator is then screwed back on nipple, valve opened and sampler worked down into the pipe line.

the use of expensive valve installations at each test location or taking a line out of service.

Use of the nipple affords corrosion engineers greater opportunity than ever before to observe and study the internal behavior of gas lines.

As an example, corrosion coupons, the small metal test strips used by engineers, can be placed in a line and taken out at any time. Weight loss of these coupons between the time they are put inside the pipe and taken out tells the engineer a great deal about the rate and degree of corrosive action present in the line. A special water sampling device that can be lowered through the nipple enables him to take a water sample for indications of corrosion products. A thermo-coupling device to measure heat in the line can also be inserted.

Beginning last winter the nipples were installed at approximately 40 locations in the Carthage area. Several hundred tests and observations have been made since that time.

The nipples are welded to the top of the line. Since pipe lines are normally buried several feet underground, pre-fabricated "bell-holes" of corrugated iron with heavy plank floors are placed over the line at each test location to give engineers ready access at any time.

The nipple has inside and outside threads. The plug seal is screwed to the inside threads and pressed tightly against a tapered seat in the bore of the nipple, thus effecting a positive seal. When the nipple is not in use, a cap is screwed to the outside threads.

When making tests, the cap is taken off and a valve installed on the nipple. The job of inserting and removing the various testing devices is done by a tubular instrument known to the oil and gas field trade as a lubricator. It is a pressure equalized vessel that makes it possible to go in and out of a pipe line or other vessel under pressure.

Operating through the opened valve the pressure lubricator is used to unscrew and remove the plug seal from the nipple. As the plug seal is taken out the valve is closed and pressure released from the lubricator. Then the engineers can insert their coupon, water-sampling equipment or thermo-coupling device into the lubricator, open the valve, and lower the device into the pipe line.

Each of the testing devices is attached to a plug which seals in the nipple, allowing the engineers to remove the lubricator and valve for use at other locations.

ACKNOWLEDGMENT

Reprinted from *United Gas Log*, October, 1954.

—**The End**

CLOSE-UP, LEFT, shows how sampling device rests on bottom of line. Engineers then take samples of liquid, center, to study for traces of corrosion products. When tests are concluded, lubricator and valve are removed for use at other locations.

Gas Line Hydrogen Blisters And How to Prevent Them

Severe breaks in natural gas transmission lines have been traced to hydrogen blisters inside the pipe caused by slight amounts of water, hydrogen sulfide and carbon dioxide.

By FILIPE PAREDES and W. W. MIZE
Senior Engineers, El Paso Natural Gas Company, El Paso, Texas

In 1950 El Paso Natural Gas Company constructed a 24-inch trunk line with 16-inch and 8-inch laterals from the Barker Dome field in southern Colorado and northern New Mexico to a natural gas treating plant in Fruitland, N. M. The gas contained 15 mole percent carbon dioxide and 1 mole percent hydrogen sulfide. A diagram of the line is shown in Figure 1. The line operated well for several months and then a series of breaks began.

The first break on the 24-inch line occurred on October 27, 1951 and another break occurred four days later. The first break on the 16-inch lateral occurred on December 13, 1951. During December and January, there were two breaks on the 24-inch line and five breaks on the 16-inch lateral. It was decided that metal separations in the pipe wall were the cause of the line failures. Figure 2 is a picture of one of the early breaks on the 16-inch lateral, note the blister at the end of the pipe. Figure 3 is a close-up of the blister.

A group of metallurgists and company officials met in February 1952 and it was suggsted that hydrogen might be the cause of the blisters. A report of similar blisters found in oil refinery vessels was discussed.[1] It was decided that hydrogen activity probes should be inserted in the lines to determine if hydrogen was the cause of the blisters. The location of the probes is shown in Figure 1. A cutaway section of a probe[2] is illustrated in Figure 4.

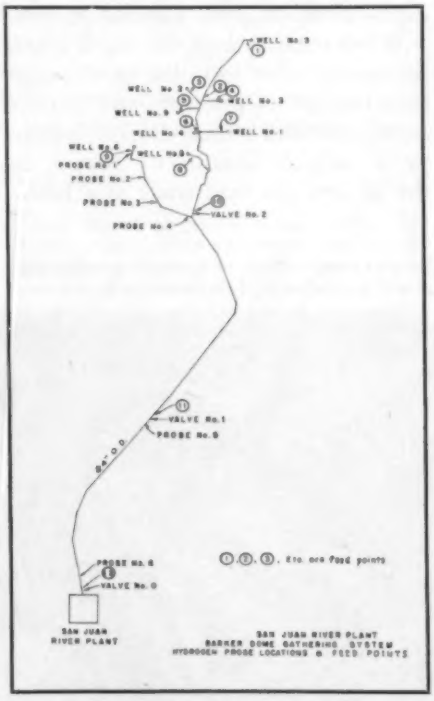


FIGURE 1

If hydrogen attacks the steel it will probably go through the thin wall section of the probe and find an artificial cavity or metal separation at the annulus of the rod. Gas collected in the annulus would bleed off through a vent hole in the rod and out through a capillary tube to a pressure gauge.

Figure 5 shows the probe installed. An indication of pressure was observed in three probes on the same day. Gas from a blister was analyzed and found to be 94 percent hydrogen, 2 percent methane, and traces of carbon dioxide and carbon monoxide. It was obvious that hydrogen blisters caused the failures.

To find the source of hydrogen, gas from each well in the Barker Dome field was analyzed, for hydrogen and other contaminants. Only one well showed a high content of hydrogen, 0.2 mole percent. From the analyses it was decided that corrosion on the internal walls of the pipe was the source of hydrogen.

Because of the success of an organic inhibitor in combating corrosion and tubing failures in the wells at Barker Dome, the same organic inhibitor was injected into the line on April 22. One quart of inhibitor per 4 million cubic feet of gas was used. On May 17, the last indication of pressure was recorded on the first probe below the point of injection. As the inhibitor traveled down the line the probes stopped indicating pressure. Corrosion was evidently inhibited. There have been other breaks on the system since injecting the inhibitor, which were caused by the damage already in the pipe.

Description of breaks. Most of the breaks originated in the failure of a blister and most blisters broke toward the inside of the pipe against the gas pressure. In all breaks the pipe ripped in two places, 180 degrees apart,

Fig. 2—One of the first breaks on the 16-inch lateral.

Fig. 3—Close-up of the blister.

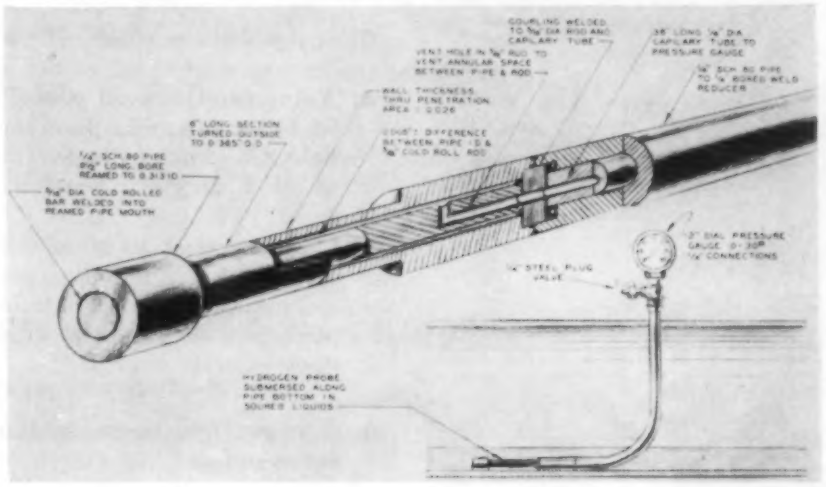


Fig. 4—Cutaway section of a probe.

Fig. 5—Hydrogen probe installed.

usually at 3 and 9 o'clock. The breaks continued in this position and unraveled at the end as shown in Figure 6. The breaks followed a sinusoidal curve, Figure 7. The pattern of the rips was not disturbed by the presence of the welds. On one occasion a severed section of the pipe was carried 200 feet away. The symmetry of the curve was broken only when the rip went through other blisters.

It was not difficult to determine the origin of the breaks since a peculiar cleavage fracture appeared on the wall of the pipe as shown by Figure 8. The herringbone pattern pointed toward the origin of the break. The rate of fracture is not known. In tests run by Battelle Institute the rate of crack propagation has been estimated as high as 4100 feet per second. The break apparently follows a shock wave front with the characteristics of a brittle fracture. Fractures have been observed to travel many inches ahead of the visual break. Battelle Institute is studying the characteristics of these breaks.

Theory of hydrogen attack. Many instances of hydrogen attack on low carbon steel are known.[3] Most of these have occurred in refinery vessels carrying exceedingly corrosive solutions at high temperatures. Apparently this was the first experience of hydrogen blistering in gas transmission lines.

Corrosion is a source of atomic hydrogen. Hydrogen sulfide and carbon dioxide gases dissolve in water to form dilute acid solutions which attack iron according to the equation:

$$2Fe + 2HAc \rightarrow 2FeAc + H_2$$

(iron) + (weak acid) → (salts of the iron) + (molecular hydrogen)

A breakdown of this formula shows what takes place in the anode and the cathode of the corrosion cell, respectively:

$$Fe^{\circ} \rightarrow Fe^{++} + 2e$$
$$2H^{+} + 2e \rightarrow 2H^{\circ}$$
$$2H^{\circ} \rightarrow H_2$$

In the presence of a catalyst, atomic hydrogen will not combine to form molecular hydrogen, and it is this

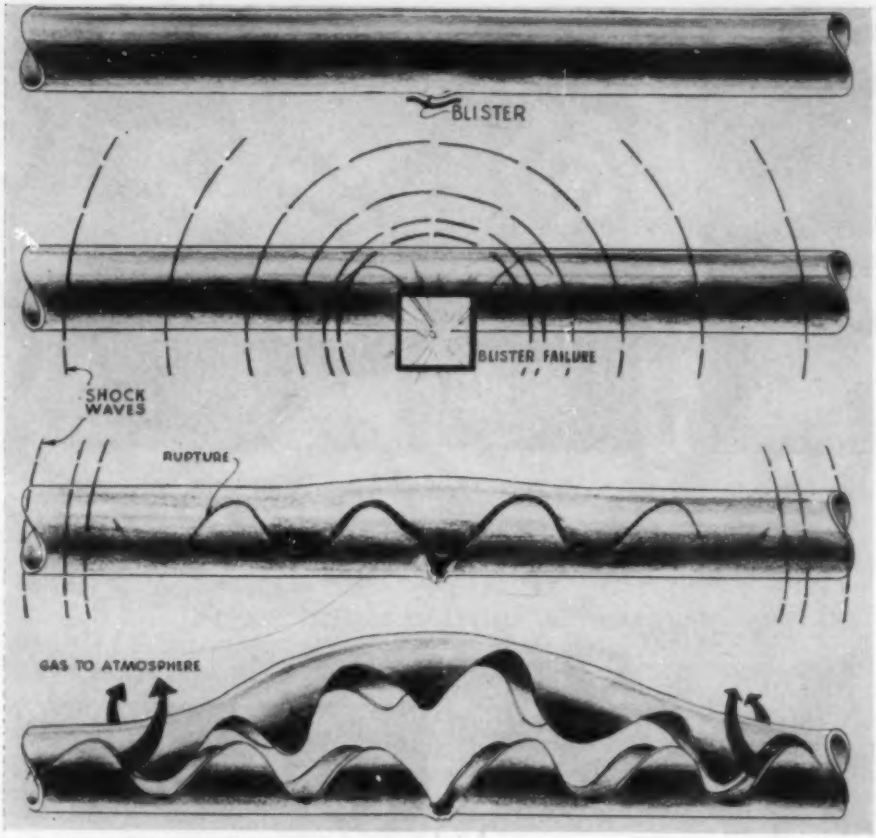


Fig. 6—Artist's conception of a break.

Fig. 7—Break in sinusoidal curve.

Fig. 8 — Herringbone pattern on pipe wall.

atomic hydrogen that is readily absorbed by the steel.[4] The catalyst is H_2S and FeS. Hydrogen blistering is the result of atomic hydrogen penetration[5] and the conversion of atomic hydrogen to molecular hydrogen at internal discontinuities within the steel.[6] The amount of corrosion necessary to have an adequate supply of atomic hydrogen for hydrogen blistering is not known.

The refinery industry observed the following conditions necessary for hydrogen blisters:[7]

1. A steel surface subject to corrosion.
2. A source of reactive hydrogen.
3. A liquid water phase.
4. An agent capable of poisoning steel surface so that the formation of molecular hydrogen from atomic hydrogen is retarded.
5. Gross imperfections in the steel, such as slag inclusion, a void, a discontinuity, or minute imperfections such as rifts within single crystals.
6. A promoter which maintains an active surface.

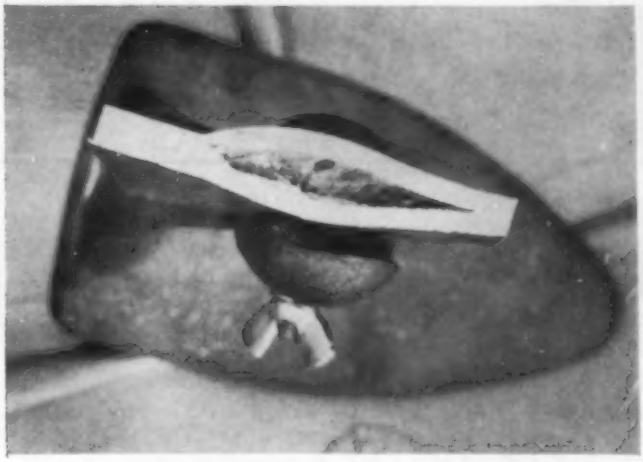
The steel surface subject to corrosion was the pipe line. Hydrogen sulfide and carbon dioxide in the gas caused corrosion which is the source of reactive hydrogen. The liquid water phase was the condensed moisture in the gas. Hydrogen sulfide was the poisoning agent which retarded the formation of molecular hydrogen. By virture of the method of rolling and cooling, the steel plate offered the gross imperfections and discontinuity necessary for hydrogen blisters. Hydrogen sulfide is the promoter that maintains an active steel surface for the absorption of atomic hydrogen.[8] Most of the breaks originated on the lower portion of the line where there is a higher concentration of water. Lower temperatures during winter months increased the amount of condensation.

High concentration of atomic hydrogen on the surface of the steel and a steel surface that can prevent the combination of atoms to molecules

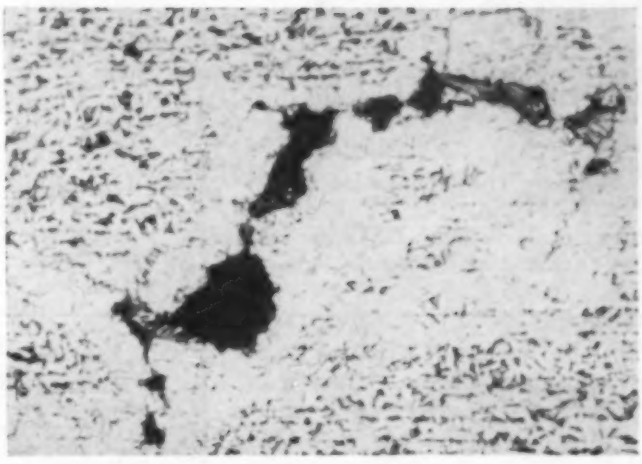
of hydrogen gas are conditions necessary for hydrogen penetration. The rate of diffusion of hydrogen through steel depends on:

1. **Condition of the steel.** Highly stressed such as cold-worked or improperly annealed welded steel shows greater diffusion rates than lower stressed steel.
2. **Low pH.** High penetration rates are found in low pH systems and decrease as the pH increases.
3. **Presence of a poisoning agent.** Laboratory experiments show that the presence of cyanide increases the rate of penetration, and it decreases as the cyanide concentration decreases.
4. **Temperature and pressure.** The solubility of hydrogen increases with temperature and is proportional to the square root of the partial pressure of hydrogen.[9]
5. **Austenitic or ferritic steel.** Austenitic steels dissolve hydrogen 4 or 5 times faster than pure iron or low-alloy ferritic steels.

PART OF 3156-FOOT BREAK. Origin of one of the three ruptures was traced by chevrons to area in center of picture.



PICTURE OF HALF-BLISTER. Largest distance betwen laminations one-half inch. Note flaky and stringy condition of steel inside blister.



MICROGRAPH AT EXTREMITY of blister showing portion of crack. Note carbon depletion of area immediate to crack and decarburization of branching cracks.

Preventive methods

1. **An organic inhibitor** forms a tightly adherent adsorbed film on metal surfaces, perhaps 1 or 2 molecules thick. This film will adhere to the surface of the metal by forces of chemical union forming a closely packed barrier to the migration of corroding agent molecules. On the line at Barker Dome, the organic inhibitor prevented the hydrogen sulfide and water in the gas from attacking the steel.
2. **Alter the surface of the steel.** Precoating or lining with alloys of chromium and molybdenum or by the use of austenitic steels which have been found to be satisfactory at all temperatures and pressures.
3. **Polysulphide injection.** Laboratory experiments and experience in petroleum refinery plants have shown that polysulphide will decrease corrosion of low carbon steel and afford a protective film to the steel to prevent hydrogen attack.[10]

Conclusion. Hydrogen blisters are of considerable interest and may result in expensive vessel or pipe failures. They have been successfully prevented in refineries by the use of polysulphide inhibitors and stainless steel alloys. In a gas transmission line, they presented a new problem which was successfully solved by the use of organic corrosion inhibitors.

APPENDIX

Pipe specifications. 24-inch outside diameter by .271-inch wall, 68.678#/foot electric fusion welded blacksteel pipe ends beveled 25° for welding in lengths from 29 feet —0 inches to 31 feet —6 inches, not less than 27 feet —0 inches acceptable in accordance with specifications L1, dated 1-1-49.

Pipe manufactured from open hearth steel plates. The inside weld bead is applied with steel tabs in place, by means of automatic submerged arc welding. Pipe is expanded with an increase in diameter approximately 1.75 percent to 1.95 percent;

Continued on Page 78

Rules of Thumb

FOR THE PIPELINER'S NOTEBOOK

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These formulae from the pages of engineers' own notebooks yield rough, but reasonably accurate answers for design, maintenance and supply questions. The Editors will pay $15 for your pet Rule of Thumb. Send your Rule of Thumb to Donald M. Taylor, Editor, PIPE LINE INDUSTRY, P. O. Box 2608, Houston 1.

Engineering Design

—18—How to estimate the compressor horsepower required for gathering systems where the discharge pressure is approximately 1000 psi.

Rule: Use the following formula for reciprocating compressors where the compression ratio is between 1.20 and 1.40. Brake horsepower per MMCF per day = 11 + (42.5) (R — 1.20) R is compression ratio.

Example: How much horsepower would have to be installed in a field compressor station where the discharge pressure would be 1055 psia and suction would be 800 psia. The station must handle 10,000,000 cubic feet per day.

Solution: The compression ratio is $\frac{1055}{800} = 1.32$ substituting in theformula: Brake horsepower per MMCF = 11 + (42.5) (1.32 — 1.20)

= 11 + 5.1

= 16.1 hp.

The station would require 161 hp.

For a centrifugal compressor the formula would be: Brake horsepower per MMCF per day = 10 ± 49 (R — 1.20)

Example: How much horsepower should be installed in centrifugal compressor station handling 100,000,000 cubic ft. per day if the suction and discharge are the same as above?

Solution: Brake horsepower per MMCF = 10 + 49) (.12) = 15.9

For 100 MMCF the horsepower would be 1590.

Hydrogen Blisters

Continued from Page 77

pipe decreases in length approximately 2⅞ inches with a hydraulic pressure approximately 1650 pounds per square inch.

Hydrostatic test. 24-inch OD by .271-inch wall pipe — 1060 psi. This pressure held for 10 seconds and then reduced to 500 psi. and visually inspected for leaks.

Chemical analysis. 24-inch OD by .271-inch wall.

	Ladle Analyses			
	Carbon	Manganese	Phosphorus	Sulfur
Maximum	.28	1.00	.049	.046
Minimum	.20	.64	.015	.018
Average	.243	.778	.0265	.0311
	Check Analyses			
Maximum	.29	1.06	.056	.047
Minimum	.20	.65	.015	.017
Average	.245	.803	.0271	.0315

All check analyses meet specifications L-1, which merely limits the carbon content to 0.30 percent. All chemical analyses meet with the requirements of API-Std. 5LX.

Tensile tests. As required by specifications L-1, tensile tests were made on specimens cut from one length of pipe made on each heat of steel. Transverse tensile test specimens cut approximately 90° from weld.

Transverse Test of Steel			
	Yield Str. PSI	Tensile Str. PSI	Elong %
Maximum	68,540	94,550	32.5
Minimum	53,280	73,240	23.0
Average	59,438	81,875	29.06
Transverse Test Across Weld			
Maximum	93,260		
Minimum	76,070		
Average	84,661		

All the tensile tests meet with the requirements of specifications L-1 and also with the requirements of API Std. 5-LX, with respect to minimum transverse yield strength of grade X52 line pipe.

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[1] **Hydrogen Attack of Steel in Refinery Equipment,** R. T. Effinger, M. L. Renquist, A. Wachter, and J. G. Wilson, May 1, 1951.

[2] Ibid., page 20.

[3] **Prevention of Hydrogen Attack on Steel in Refinery Equipment,** W. A. Bonner, H. D. Burham, J. J. Conradi, and T. Skei, May 1953.

[4] **Hydrogen Attack of Steel in Refinery Equipment,** R. T. Effinger, M. L. Renquist, A. Wachter, and J. G. Wilson, May 1, 1951, page 2.

[5] Ibid., page 2.

[6] Ibid., page 3.

[7] **Prevention of Hydrogen Attack on Steel in Refinery Equipment,** W. A. Bonner, H. D. Burham, J. J. Conradi, and T. Skei, May 1953, page 4.

[8] Ibid., page 4.

[9] Ibid., page 6.

[10] Ibid., page 9.

Presented at Ninth Petroleum Mechanical Engineering Conference, ASME, Los Angeles, Sept. 26-29, 1954.

—The End

In pipe line pumping

Evaluating the Performance Of Motors

- Reduced voltage starting usually unnecessary.
- Reduction of inrush current may reduce efficiency.
- Starting torque is relatively unimportant except for its effect on accelerating torque.

By E. B. TURNER, Industrial Engineering Section, General Electric Company, Schenectady, N. Y.

Part 2

Motor characteristics. After it has been determined that the specified motor meets these general requirements, then the operating characteristics should be examined. These characteristics will be discussed in the following order:

- Inrush current
- Maximum torque
- Starting torque
- Minimum accelerating torque
- Efficiency
- Power factor
- Insulation

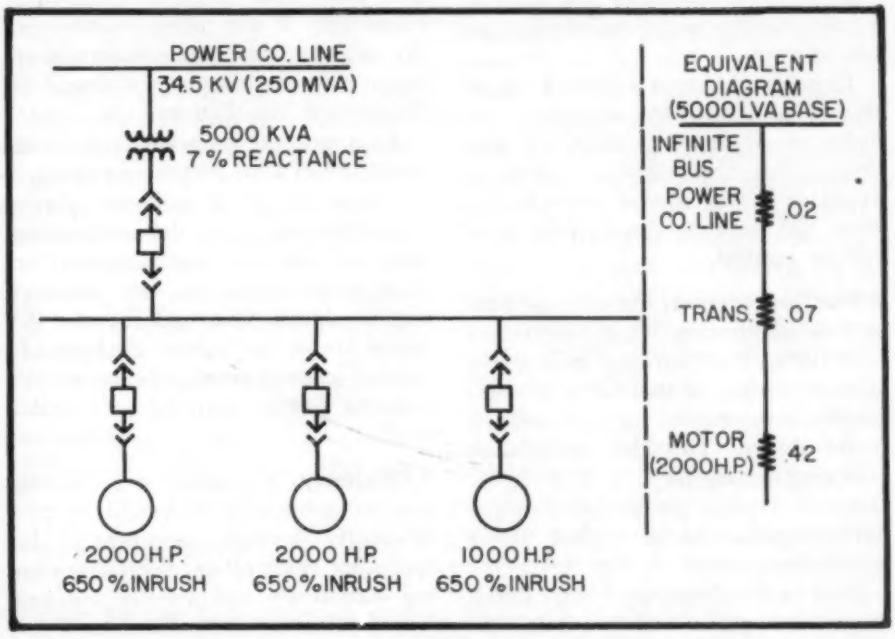

FIGURE 8

From Reactance Diagram:

$$\text{Minimum Voltage at Motor Terminals} = \frac{.42}{.51} = 82.4\%$$

$$\text{Minimum Voltage on Power Co. System} = \frac{.49}{.51} = 96.1\%$$

$$\text{Maximum Inrush Current} = \left(\frac{.42}{.51}\right)(650\%) = 536\%$$

$$\text{Maximum Torque Available Under Worst Condition (225\% maximum torque rated)} = \left(\frac{.42}{.51}\right)^2(225\%) = 153\%$$

• Inrush current. Often the inrush current of a motor, that is, the initial value of current which flows when the motor is placed across the line, is an important consideration if a power system of limited capacity is supplying the station. However, the problem should be considered very carefully. Usually the use of reduced voltage starters is unnecessary and expensive. In addition, it provides only a small difference in the maximum voltage dip compared with that obtained using full-voltage starting.

The value of inrush current which is usually given is the locked rotor current *with full voltage applied*. This value is usually never realized in the practical case. When the voltage dips, the amount of current which will flow is decreased in an essentially direct ratio.

For instance, if a certain motor has 650 percent locked rotor current (rated voltage applied) and is connected to a system where a 10 percent voltage dip is expected, the *maximum inrush current* will be 0.90 x 650 = 585.0 percent or for a voltage dip of 20 percent, it will be 0.80 x 650 = 520.0 percent rated.

Actually, these values are a little high since inrush current decreases at a slightly greater rate than the voltage. Essentially, the power company system and the transformer bank feeding the main motor act as a reduced voltage starter.

In the following example a practical case is considered (Figure 8). From this it can be seen that the voltage at the motor terminals is reduced to 82.4 percent which means that the maximum torque value under the worst condition is 153 percent rated, full load torque. This is ample to accelerate the pump and any loaded pumps which are running will easily ride out the voltage dip.

The power company system experiences a dip to 96.1 percent rated at the transformer primary, which is not

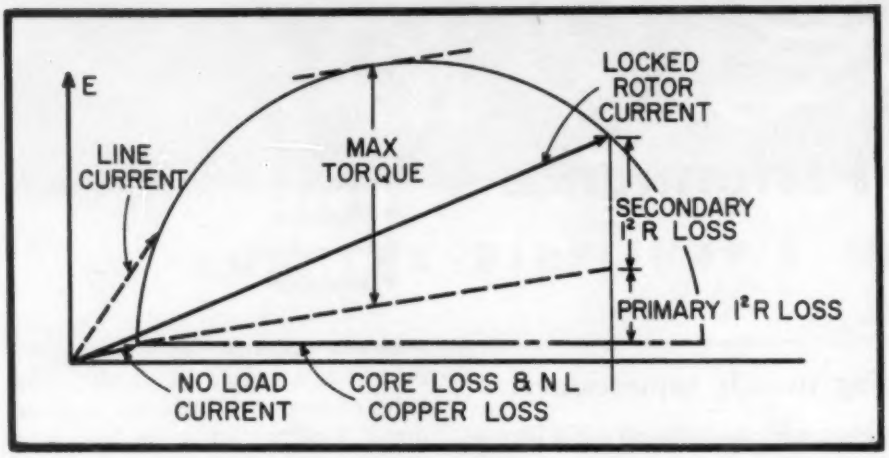

FIGURE 9

considered excessive since starts are relatively infrequent. When considering a value of inrush current, it should be remembered that this value of inrush current and the maximum torque available are dependent variables. That is, if a low value of inrush current is specified, this places an upper limit on the maximum torque that any given motor is capable of producing, unless maximum efficiency is reduced.

• **Maximum torque.** In most industrial applications, an induction motor should be capable of delivering at *least twice* its rated torque at rated voltage. This torque value provides a reasonable margin of overload and will permit a fully loaded machine to maintain load through voltage variations to approximately 75 percent rated (torque varies inversely as the voltage squared).

For pipe line pumping applications, the fact that motor speed becomes unstable as this torque limit is approached is a very good reason for being sure that maximum torque capabilities are not less than 225 percent of rated full load torque at rated voltage.

This means that, maintaining top full load efficiency and power factor, the inrush current will be in the order of 650 percent of rated for base-ventilated enclosures and 750 percent for totally-enclosed fan-cooled enclosures. The familiar circle diagram (Figure 11) offers correlation of this link between inrush current and maximum torque.

The various quantities are labeled on the circle diagram in Figure 9. From this it can be seen that as a limiting condition the locked rotor current approximates the diameter of the circle and the maximum torque approximates the radius of the circle. With this relationship established, it can be said that on a percentage basis, the percent maximum torque cannot exceed something less than one-half the percent maximum inrush current.

From Figure 8 showing maximum voltage dip and the actual inrush current and Figure 9 showing the tie between this inrush current and the maximum torque available, it should be evident that any specification calling for an unnecessarily low value of inrush current is penalizing the pipe line operator.

In order to guarantee continuity of service and thereby continued delivery of whatever product the pipe line carries, this value of maximum available torque should never be less than 225 percent rated with rated voltage applied.

• **Starting torque.** On oil pipe lines or any application where the motor is driving a centrifugal pump, the starting torque of the motor is not a major factor except as it effects the motor design. This can be seen by referring to Figure 10. This figure shows a typical pump speed-torque curve imposed on a typical motor speed-torque curve.

It is evident that very little initial torque is required to break away the pump and start it accelerating. These main drive units are almost always started with the discharge valve closed. Some automatic sequence operations close the power circuit of the discharge valve operating motor at the same time the main motor is put on the line but due to the longer period of time that the valve takes to operate, this is essentially starting against a closed discharge valve.

In this case (closed discharge) full-speed torque requirements of the pump are in the order of 40 to 60 percent rated, depending on the individual pump and its condition and also the condition of the valve.

With a given pump, the minimum acceptable accelerating torque will determine the starting torque for a motor with a given inrush (and consequent maximum torque). The same motor with a higher inrush current will have greater maximum torque and a larger margin of accelerating torque.

• **Minimum accelerating torque.** From Figure 10, it can be seen that the "danger zone" lies between 60 and 80 percent speed. This is where the minimum accelerating torque is available. If the pump were leaking badly or if the discharge valve were partially open, there is a possibility that the motor would reach this "danger zone" speed and accelerate no further.

At this speed, it can be seen from Figure 10, the inrush current has not decreased appreciably and the motor will heat excessively. Some allowance should be made to prevent this from happening. If the pump characteristics are available, some minimum allowable accelerating torque should be determined (see Figure 11).

As a general criterion, this value should be at least 15 percent of rated full load torque. If a lower margin than this is expected, the accelerating time may be excessive. This puts an unnecessary strain on the windings and insulation and will shorten the useful life of the motor. This consideration in most practical cases makes reduced voltage starting very undesirable.

• **Efficiency.** Pipelining is a business and as a business it should be run efficiently. A large percentage of the operating costs of an electric pumping station are power costs and any loss of efficiency means increased operating costs which mount up rapidly over a period of time.

If in a given motor more accelerating torque margin is needed, it can be obtained in two ways. Either by adding resistance to the rotor circuit or increasing the inrush by decreasing the rotor reactance. If in trying to reduce inrush current and maintain accelerating torque margin, it is necessary to add resistance to the

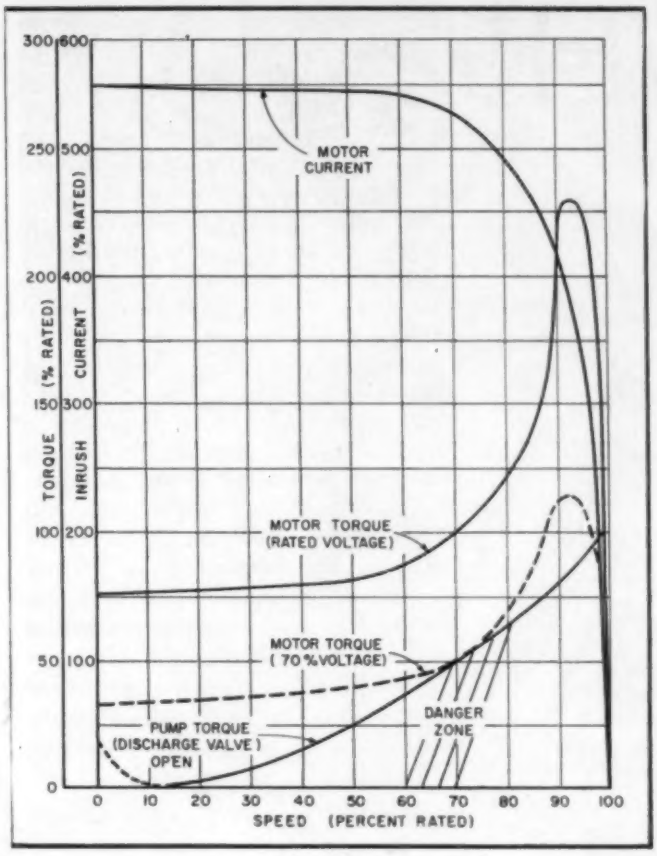

FIGURE 10

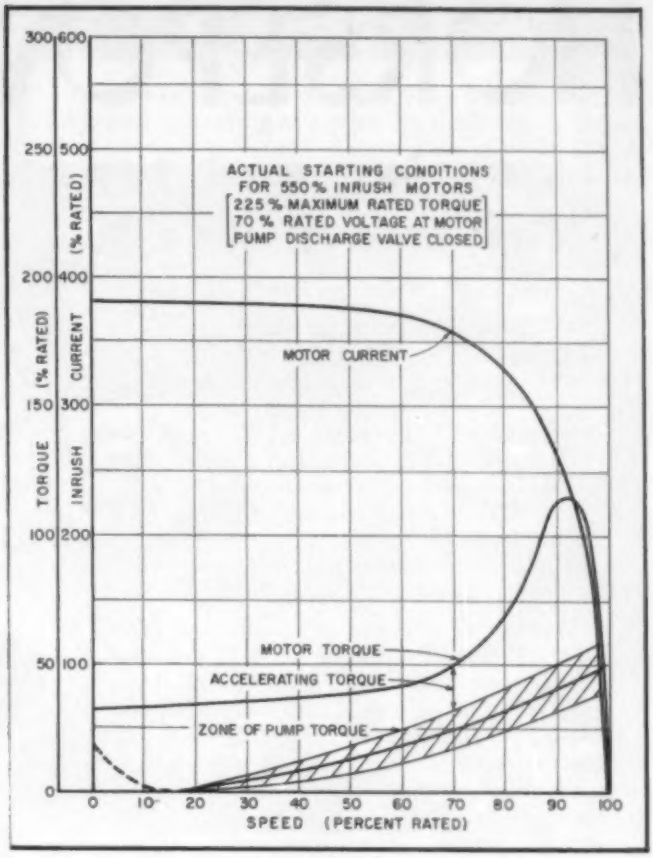

FIGURE 11

rotor circuit, a loss in efficiency will result.

It can be seen from this that a very thorough evaluation of the inrush problem should be made before valuable efficiency is given away. Considering that very little can be gained by this reduction in inrush current and actually the maximum efficiency of the motor may be reduced, this alternative should be considered only as a last resort after all the possibilities have been examined.

The normal minimum guaranteed efficiency at full load should be approximately as follows:

350 hp	2300 volts	4000 volts
3600 rpm	93.8%	93.5%
1800 rpm	92.9%	92.7%
3500 hp		
3600 rpm	95.8%	95.7%
1800 rpm	95.2%	95.1%

• **Power factor.** Power factor is usually not a real consideration. For most pipe line applications the motor power factor is sufficiently high so that the power rate penalty is avoided. If this is not the case, capacitors can be applied. Therefore if a motor has been designed for best flux distribution across the air gap, the power factor is high and any increase above this value could prove to be detrimental. There is a basic relationship between air gap and power factor, that is, a smaller air gap means a higher power factor and vice-versa.

This indicates that there is some minimum dimension of air gap which should be observed. This minimum air gap is the sum of shaft sag; eccentricity of the rotor in the stator caused by normal manufacturing tolerances in end shields, bearing brackets, and the stator and rotor themselves; and the distance necessary to obtain good flux distribution.

The normal thermal expansion of the rotor decreases this air gap when the machine is loaded. There have been cases where air gap has been sacrificed to improve power factor and this normal expansion has caused rubbing between the stator and rotor. On self-cooled machines, this could show up as an inability to start shortly after stopping. This is due to the additional expansion when cooling air is cut off.

Some typical values of "design" air gap are listed in the following table:

Rotor Dia. In Inches	3600 RPM Speed Design Gap in Mils	1800 RPM
17	80	45
20	100	50
23	125	55

The actual air gap measured by feeler gages should be approximately 80 percent (due to normal manufacturing tolerances mentioned above) of the values given above.

The normal minimum guaranteed power factor at full load should be approximately as follows:

350 hp	2300 volts	4000 volts
3600 rpm	92%	92%
1800 rpm	88%	88%
3500 hp	91%	90%
3600 rpm	91%	90%
1800 rpm		

Since increasing power factor above normal values does not result in any benefit to the pipe line operator, it is to his best interests to be sure that the minimum design air gap is not less than the values given above.

• **Insulation.** There are usually only two reasons for the use of Class B insulation. They are:

1. To compensate for high ambient temperatures.
2. To permit designing greater capacity into a given frame size by using higher temperature rises.

A large percentage of pipe line pumping motors (those above 500 hp in the TEFC enclosures), use Class B insulation for reason No. 2 above. This is true of any TEFC motor and

HORSEPOWER

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Whether it's repowering old equipment or buying new — too much or too little horsepower can prove costly. Equally as important as proper horsepower, is correct engineering of the application. Quite often, it is necessary that engine accessories be mounted in accordance with requirements of the equipment. It usually takes a right size and right design to supply the specific power needs for each type of machinery.

The engineering and sales policy of Hercules Motors Corporation is to design and sell internal combustion engines to fulfill the specific needs of each customer. For example, in equipment with limited engine installation area, "flat" or horizontal engines are often the answer. These engines can be placed under floors, or in any area which does not permit vertical installation. (Consult factory for models available.) Special Hercules vertical engines with accessories located on one side, permit installations near a firewall or bulkhead which is permanent and does not allow access to one side of the engine. These are but a few of the many problems which are often encountered in the proper application of an engine.

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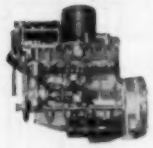
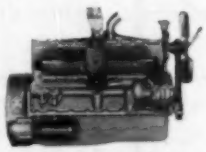
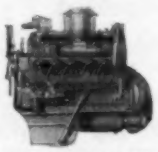
Hercules Model NXB
2 cylinder gasoline engine
15.6 H.P.



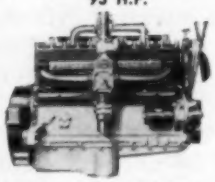
Hercules Model DOOD
4 cylinder diesel engine
79 H.P.



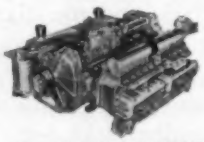
Hercules Model JXD
6 cylinder gasoline engine
112 H.P.



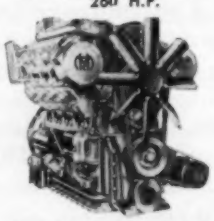
Hercules Model DIX6D
6 cylinder diesel engine
93 H.P.



Hercules Model HXE
6 cylinder gasoline engine
236 H.P.



Hercules Model DFXHF
6 cylinder diesel engine
260 H.P.



Hercules Model DNX-V8DTS
8 cylinder diesel engine
500 H.P.

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is not peculiar to pipe line pumping service. The use of Class B insulation on normal applications for reasons other than No. 1 and No. 2 above usually cannot be justified.

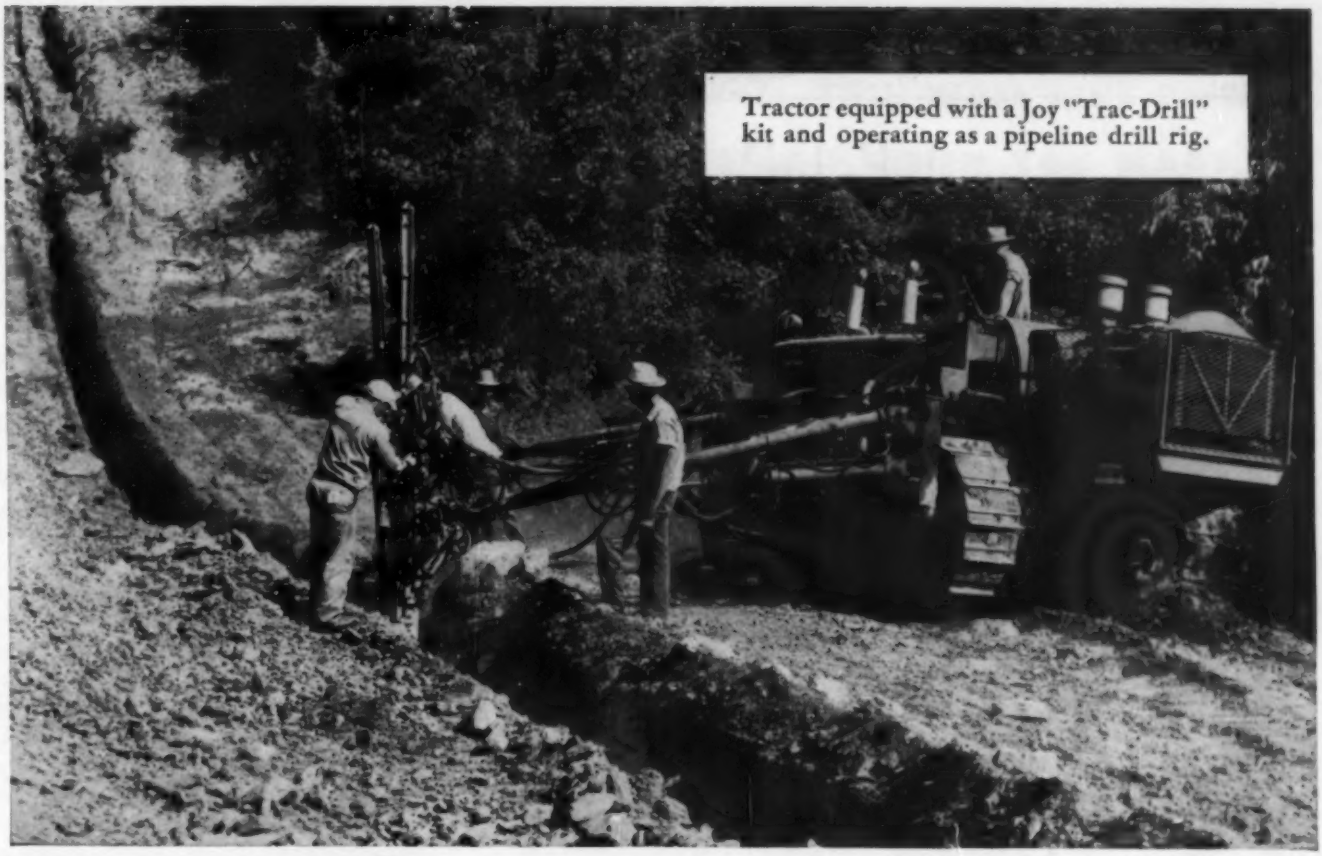
In the case of the totally-enclosed forced-ventilated enclosure if reason No. 1 above is not encountered, there is usually no reason for using other than Class A insulation on pipe line pumping service. One exception to this is where reason No. 2 above might apply. That is, increasing the horsepower on an existing pump and still use the same frame size motor so that extensive foundation alternations need not be made.

Conclusion. We would all like to obtain the best possible motor for our specific application. It was with this thought in mind that this article was written. By evaluating all the major considerations contained in any motor specification, it can be determined if the different characteristics are balanced with respect to each other.

It is hoped that a clearer picture of the application requirements of motors in pipe line pumping service has been obtained by the reader. The following conclusions can be drawn for pipe line pumping applications:

1. Reduced voltage starting is usually unnecessary.
2. Inrush current and maximum torque are directly dependent. Reduction of inrush current should not be considered if maximum torque falls below 225 percent rated.
3. Starting torque is relatively unimportant except as it effects available accelerating torque.
4. Minimum margin between torque required by pump and that available from motor should be at least 15 percent rated.
5. Reduction of inrush current may reduce maximum efficiency.
6. Reduction of air gap to improve power factor is not advantageous to the pipe line operator.
7. Class B insulation is only advantageous for high ambient temperatures or obtaining greater horsepower in a given frame size.

—**The End**



Tractor equipped with a Joy "Trac-Drill" kit and operating as a pipeline drill rig.

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The Joy "Trac-Drill" kit is a packaged drill-and-compressor unit for pipeline drilling that is easily assembled on *your* tractor. Kit consists of packaged drill and compressor units and instructions for assembly. Drill package includes Joy Silver Streak Drills, Hydro Drill Jibs, mounting bracket, hydraulic pump and other accessories. Compressor package includes a Joy WL-80 compressor, mounting bracket, air receivers, etc.

Two drills are mounted on dual, hydraulically-actuated Joy Hydro Drill Jibs. With these jibs, the drills are quickly and easily positioned and are held absolutely stationary during drilling. This is a real "Pipeliner" rig . . . the double drill arrangement permits the drilling of several holes from each tractor setup.

The Joy "Trac-Drill" moves and operates as one self-contained unit. It moves in on those tough spots in the spread faster because there is no need to tow a separate source of compressed air into the area.

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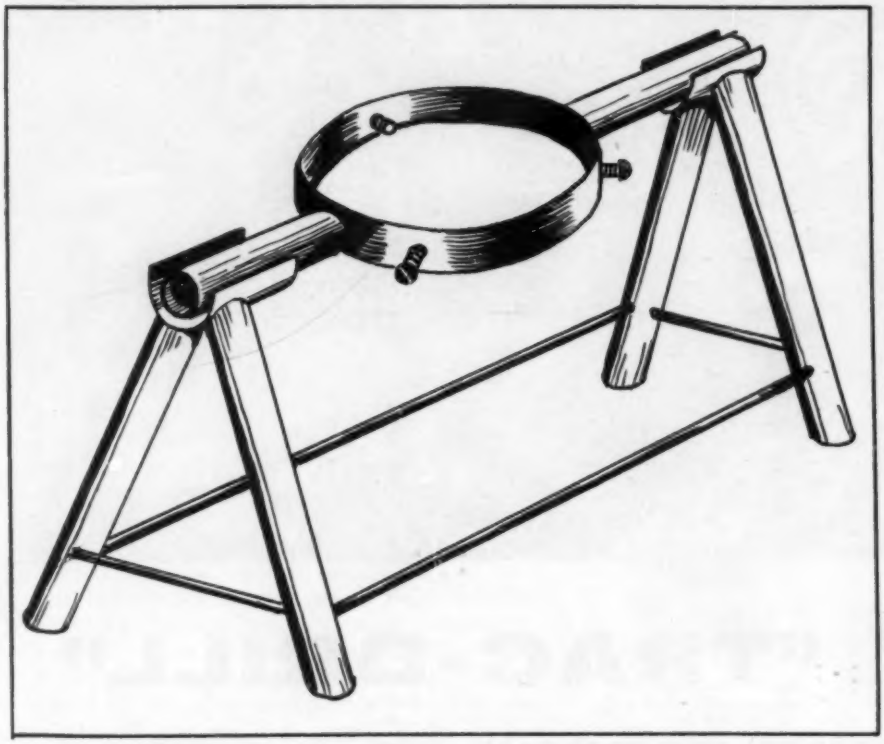


Valve Holder Provides Access to Parts

Large compressor valves are much easier to handle and to work on if they can be clamped into a holder that provides easy access to all parts of the valves. The holder shown allows repairs to be made without any hand-lifting or hand-turning of the cumbersome and heavy valves.

The holder is simple. It consists of a metal ring with three lock screws placed equidistant around its circumference.

Extending from opposite sides of the metal ring are two metal arms, made of four-inch pipe. The arms rest in semicircular mounts and provide support while at the same time allowing the entire holder to rotate.

The metal stand for supporting the holder is about three feet high. It has a rectangular base of metal pipe, with four pieces of pipe forming the legs. These legs are angled so that they form two inverted "V"'s. At each apex is placed a short piece of semicircular pipe, made by splitting a short piece of six-inch pipe lengthwise. These semicircular members are the mounts mentioned above on which the arms of the holder rest and rotate.

The valve is carried to the holder by an overhead crane or a hoist mounted on a monorail. It is placed in the metal ring and locked in place by tightening the lock screws in the ring. Resting in this holder the valve can be rolled so that any part can be made accessible.

Pickup Truck Used To Start Engine

The back-breaking and sometimes dangerous task of starting large internal combustion engines has been solved by a unique hookup involving a power take-off from a pickup truck. The unit would not be justified for just one engine, but since several are involved, this device has more than paid out in time saved and eliminating the hazard of manual starting.

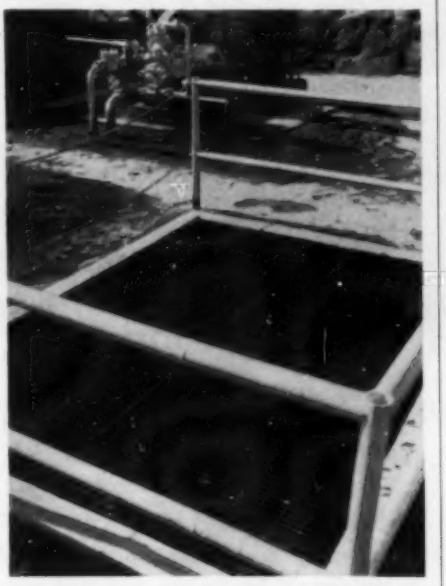
This engine starting device consists of a telescoping drive shaft, the cross-section of which is square or box shaped. It is equipped with two universal joints, one at either end.

A power take-off assembly was mounted in the truck rear bumper as indicated. This unit can be covered with a plate when not in use. The other end of the drive shaft was fitted with a ratchet drive cog which fits snugly over the crank shaft of the engine.

Photo courtesy *SUNRAY NEWS*

The pumper or mechanic backs the pickup truck up to the engine to be

started and hooks up the telescoping drive shaft with universal joints in the manner shown. With the truck engine running, the power take-off gear is engaged, thereby transmitting rotation to the engine crank shaft. As the engine starts, the rachet cog slips over the drive pins and the drive shaft becomes disengaged. The complete unit is easily carried, light in weight, and quickly set up for use.



Single Bolt Locks Gate In Remote Locations

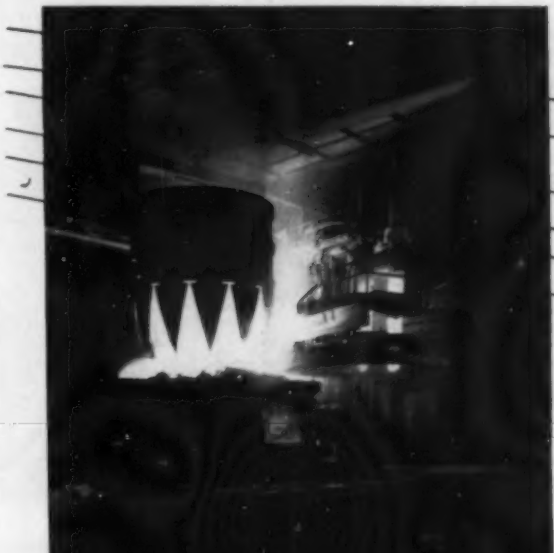
A three-fourth-inch rod, with a head on one end and hole in the other, provides the simple, effective means of preventing petty tampering of main line gates in a cellar situated in a remote location. The steel grating on this installation was made up and installed in five sections. Although use of smaller sections makes for easier access by company workmen, it also makes it easier for unauthorized persons to gain access to the valves and other equipment.

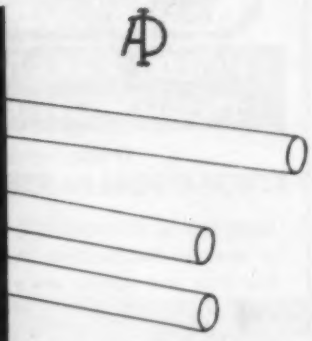
An ear, cut out of one-fourth-inch steel plate, was welded to the approximate center of each of the sections. A round hole was burned through the center of that portion above the grating level and the single bar run through them. The hole in the end of the rod permits slipping the hasp of a padlock through it, preventing withdrawal of the bar. By placing the steel ears in the approximate centers of the grid sections, they may be used to good advantage when the sections are being lifted out by a winch line.

Newport Steel

THIN-WALL LINE PIPE,

4" and 6" SIZES*, WHEN YOU WANT IT





The high quality of Newport's electric furnace steel enables us to make electric weld line pipe with walls that are thinner, yet strong enough to exceed every API and ASTM specification. The advantages of thin-wall pipe are obvious . . . less tonnage required, lower original cost, reduced freight and handling charges. This 69-year-old basic steel producer is a dependable and economical source devoting its entire pipemaking facilities to small sizes. Call Newport the next time you need 4" and 6" line pipe, or any other of the products listed on the right.

*SIZES AND WEIGHTS AVAILABLE

O.D.	Wall	Wt. Per Ft.
4½	.125"	5.84
	.142"	6.61
	.156"	7.25
	.188"	8.64
	.219"	10.00
	.237"	10.79
6⅝	.134"	9.29
	.156"	10.78
	.188"	12.89
	.219"	14.97
	.250"	17.02
	.280"	18.97

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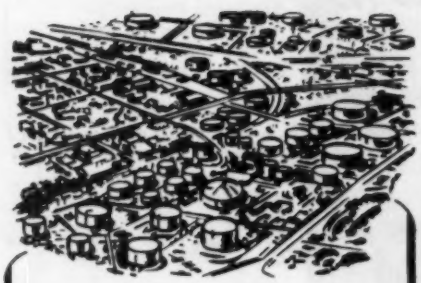

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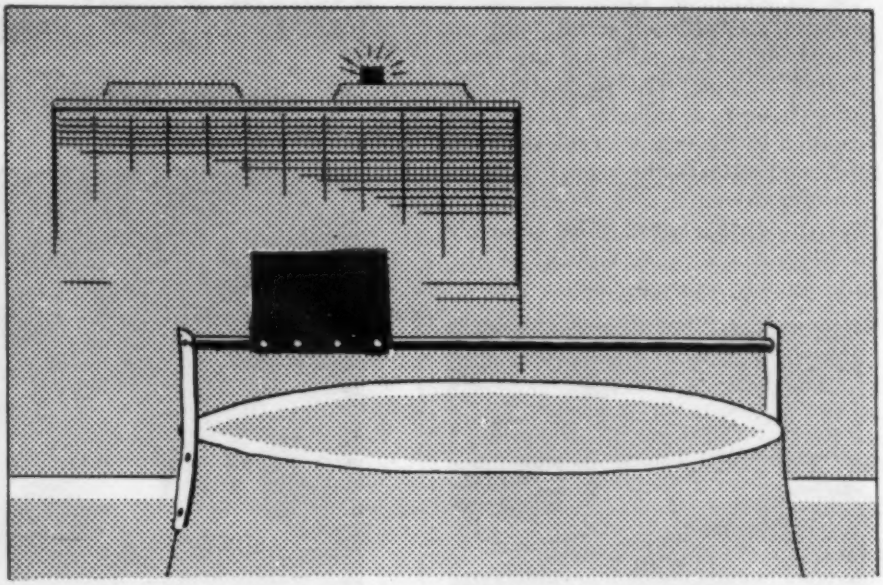

Painted Sheet Makes Visual Fan Indicator

A 12 by 12-inch flat aluminum sheet painted red on one side, yellow on the other, makes an excellent indicator to tell the compressor station operator whether or not individual fans in the cooling tower or atmospheric coolers are running.

The plate is riveted to a 1 by 12-inch piece of aluminum tubing and suspended over the fan by a piece of three-fourths-inch pipe. The aluminum tubing serves as a hinge on the three-fourth-inch pipe so the indicator plate will be blown in a vertical position once the fan is started. The horizontal pipe is supported on each side of the fan by ¼ by 1-inch by 1-inch strap steel as shown.

In each case, the luminous red paint should be on the opposite side of the cooling tower from the compressor building when the fan is not running. Thus, when each fan starts, the red signal will be visible to the operator.

Gotkool water cans and coolers

GOTKOOL WATER CAN Made in 1½, 2, 3, 5, 10, 15 and 20 gallon sizes. Push-Button Faucet at slight additional cost.

GOTKOOL WATER COOLER Made in 2, 3, 5, 8, 10, 15 and 20 gallon sizes with Push-Button Faucet.

KEEP PURE DRINKING WATER ALWAYS HANDY

GOTT Water Coolers are the convenient way to keep drinking water handy to the worker, protect it from impurities. Their exclusive construction keeps water cool for long periods. Snug-fitting, large, removable top, handy non-leaking push-button faucet. GOTT Water Cans for handy field use. Your supply store has them, get one today!

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with trouble-free, self-sealing gasket

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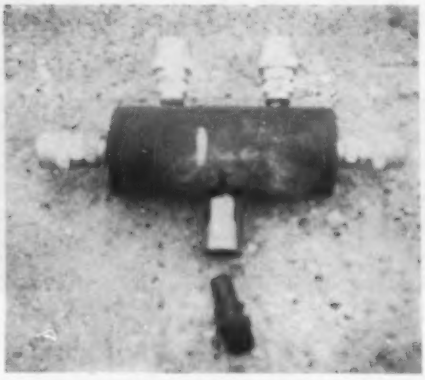
Device Aids Line Walker In Climbing Fences

This simple device which can save the line walker unnecessary effort in climbing over fences can be made from pieces of 3½-inch scrap pipe. Plant the legs in post holes on both sides of the fence and fill in with soft concrete. Snip off the barbs on the upper wires of the fence two or three feet back from the upright hand pole and eliminate the danger, too, of scratches and rips.

Multiple Air Hose Device Speeds Station Overhauls

A multiple air hose connection has proved useful in station overhauls. A lock-type swivel fitting between the air line and the connection permits four air hoses to be connected to one air line without danger of them twisting loose and blowing off.

The device can be made by welding one-half inch nipples onto a short piece of extra heavy four-inch pipe



and then simply screwing the locking connection on to the nipples. In case some of the connections are not needed, they can be easily blanked.

OVER 100 GPH FOR EACH POUND OF PUMP

YET THIS *FLOMAX-15* IS MADE OF TOUGH IRON FOR LONG LIFE

EASY TO HANDLE——WEIGHS LESS——COSTS LESS

FLOMAX **Super Hard Seals provide longer trouble-free pump life without nuisance of filling grease cups or fear of dirty grease.**

FLOMAX **Open Adaptor construction protects your engine from stray pumpage. Also provides plenty of room to work and see when servicing pump.**

FLOMAX pumps are	***FLOMAX*** pumps have
Self-Cleaning	Replaceable Wear Plate
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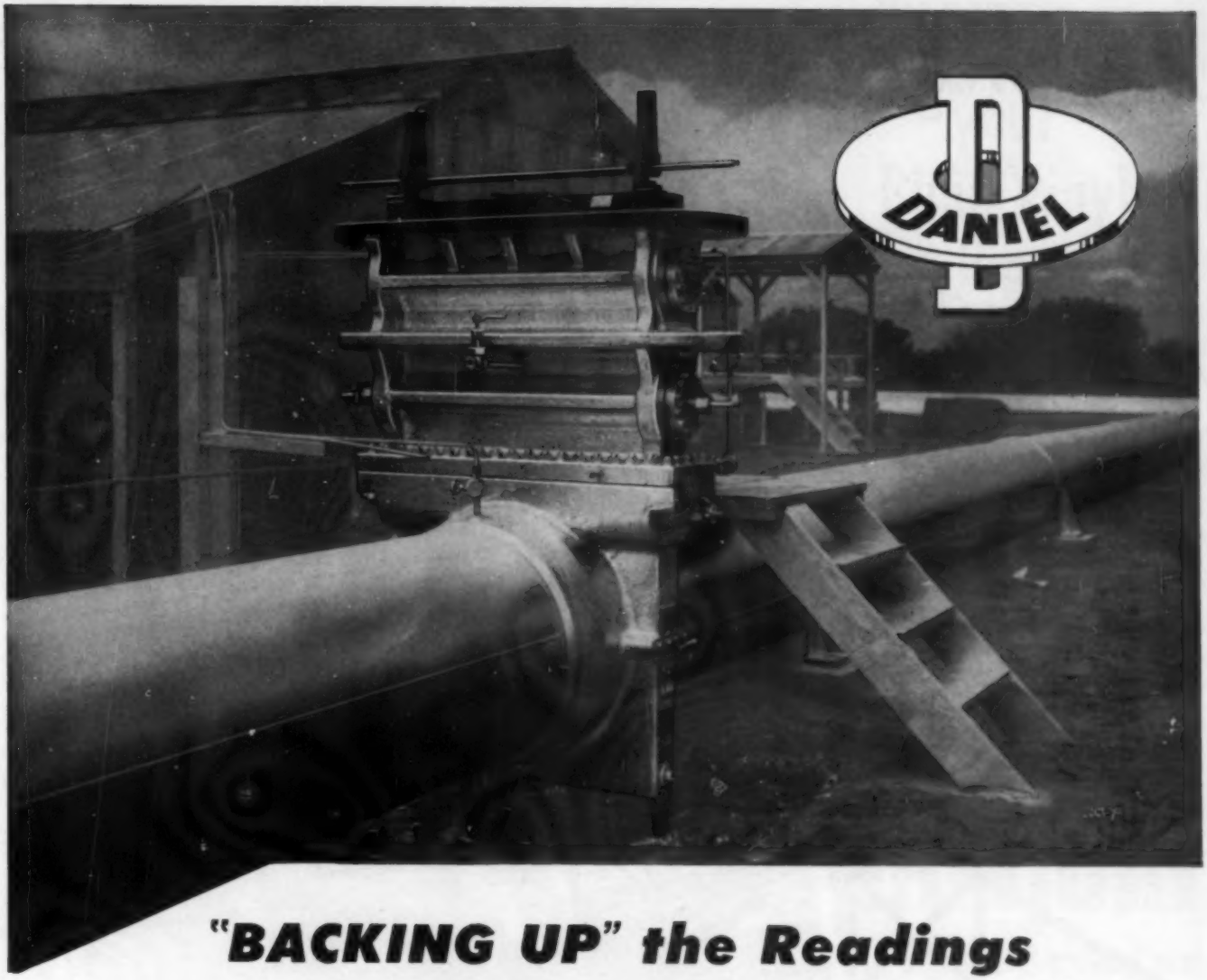

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For a quarter of a century, Daniel Equipment has been noted for dependability, quality and satisfactory performance.

Daniel Senior Orifice Fittings, in all sizes up to the big 30-inch shown above, are serving the major transcontinental pipe lines throughout the world . . . at purchase and sales stations, compressor stations and in conjunction with telemeter equipment. These fittings enable operators to change orifice plates under pressure without interrupting the flow, and without the use of costly by-passes, valves and other fittings as is the case in conventional orifice flange installations. Fast, safe and extremely simple to operate, Daniel Senior Orifice Fittings greatly reduce maintenance costs and encourage more frequent inspection of the orifice plates.

Service and engineering consultations, too, are readily available to Daniel customers through factory branches, sales offices and warehouses strategically located in the heart of the gas and oil producing areas. Agents in principal cities of North and South America.

For a full description of Daniel Orifice Fittings, Meter Runs, Check Valves and other products for the Gas, Oil and Pipe Line Industries refer to the Composite and Refinery Catalogs, or write direct.

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The Magic Touch of Electric Power

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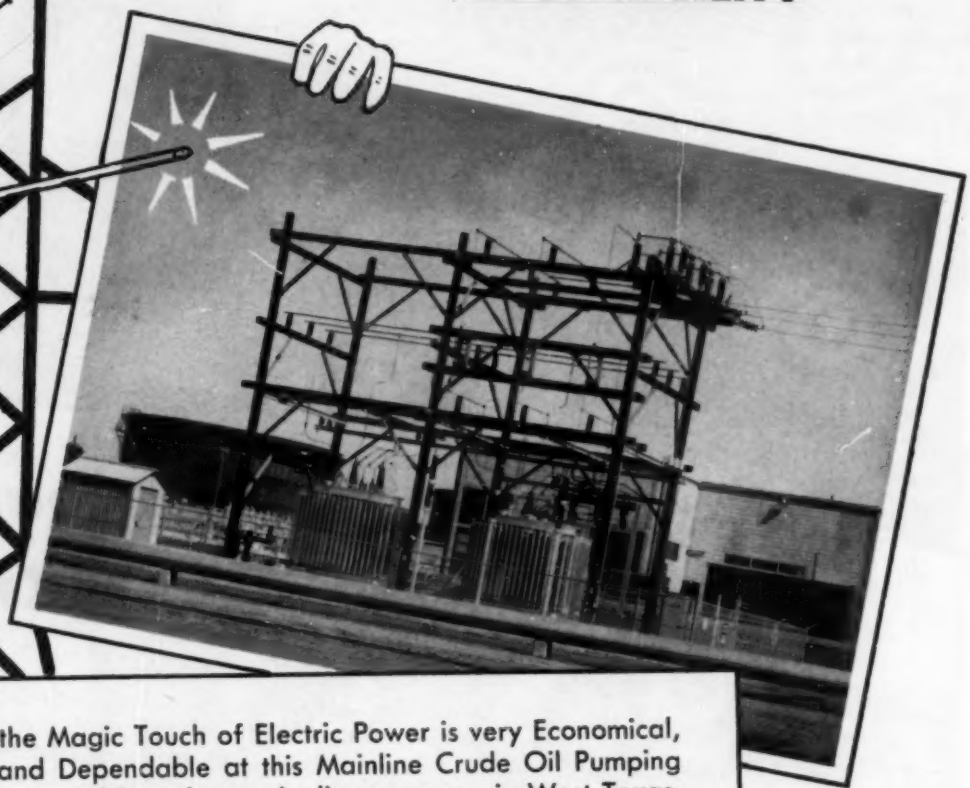
ECONOMY, EFFICIENCY, DEPENDABILITY



Yes, the Magic Touch of Electric Power is very Economical, Efficient and Dependable at this Mainline Crude Oil Pumping Station, operated by a large pipeline company in West Texas. In this station are three 3,000 H.P. and one 1,250 H.P. motors with over eighty Electrically operated valves. You can readily see that Low Cost Purchased Electric Power is doing a real job with its "Magic Touch." For the BEST ALL-AROUND POWER PERFORMANCE . . . SWITCH to Low Cost Purchased Electric Power . . . TODAY! For full details call your nearest Electric Power Company.

Petroleum Electric Power Association

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CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

WHAT'S HAPPENING

IN PIPE LINE CONSTRUCTION

Service Line Completed in Record Time

Service Pipe Line Company, a transporter of crude oil, set a world's record for laying large-diameter pipe when the final weld on its 625-mile Wyoming-Missouri line was completed at noon, November 15. The coating, only 1600 feet behind, was completed shortly after noon.

More than a thousand men and hundreds of machines worked steadily for two months to push the line through Wyoming, across southwestern Nebraska and over the plains of Colorado and Kansas into eastern Kansas and western Missouri ahead of the severe Rocky Mountain winter. The line runs from Ft. Laramie, Wyo., to Freeman, Mo.

Sixty-one days after right-of-way clearance started, September 16, final welds were made. This was a record average of better than ten miles per day. It beat the time required to lay comparable sections of the war-speeded "Big Inch," "Little Big Inch," and post-war large-diameter pipe line projects.

Pipe was laid by O. R. Burden Construction Corporation, Tulsa, and H. B. Zachry Company, San Antonio, who maintained four spreads each. J. L. Cox and Son, Raytown, Mo., Parkhill Trucking Company, Tulsa, and John Bunning Transfer Company, Rock Springs, Wyo., strung the pipe. Aero Exploration Company, Tulsa, shot the aerial maps.

Decision to build the line was made August 12, and orders for pipe were placed immediately. The first right-of-way option was taken on August 18 and the first pipe shipped from the mill August 20. The first survey crew was in the field August 24, and contracts for construction were awarded August 25.

Service divided the project into two parts, establishing company headquarters for the western section at Sterling, Colo., and the eastern section at Abilene, Kansas.

Eight spreads welded 108.6 miles of pipe during the week of October 14-21, an average of 15.5 miles per day. The record day in this period was 17.4 miles. During the same week one spread welded 3.64 miles (19,200 feet) of 24-inch in one day and 23 miles in the entire week.

Initial capacity of the line into Freeman is 178,000 barrels a day. The line is designed to handle well over 200,000 barrels a day with additional pump stations. Service Pipe Line's west Kansas system is connected to the line at Laton station near Natoma, Kansas.

Standard of Texas Lets Contract for 246-Mile Line

Standard Oil Company of Texas awarded the contract for its 246-mile El Paso-Albuquerque products line to Houston Contracting Company of Houston. Construction began in November.

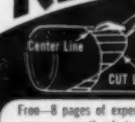
Two spreads are on the job, the first laying eight-inch pipe north from El Paso; the other laying six-inch pipe south from Albuquerque.

Conoco Completes 64-Mile Tonkawa-Oklahoma City Line

Continental Pipe Line Company's 12-inch line from Tonkawa to Oklahoma City was finished in November, giving Conoco a complete 12-inch crude line from Wichita Falls, Texas, through Oklahoma City to Conoco's refinery in Ponca City.

G. G. Griffiths Construction Company of Tulsa built the 64-mile line for Continental Pipe Line, a subsidiary of Continental Oil Company.

FREE 8 pg. BROCHURE shows direct method of making accurate PIPE LAYOUTS



Free—8 pages of expert, clear information, charts and diagrams . . . worth a fortune to any **Welder, Pipe** or **Sheet Metal Worker, Layout Man, Foreman, Engineer, etc.** . . . Explains famous "direct methods" of making **Pipe Bends up to 120°** on **any diameter** pipe, or flat sheet metal. Also **"T" Layouts, Multi-Piece Bends, Roof-jacks, Angle Iron Layouts, etc.** . . . Shows how to find **Center Lines**, check layouts and finished work . . . **ACT NOW** . . . send postcard or letter; or clip out this ad and mail with your name and address to:

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"WELD" your Rigid Vinyl Pipe

with plasjoin®

VC PIPE CEMENT

PLASJOIN VC Pipe Cement has been developed to do for rigid Polyvinyl Chloride Pipe what welding does for metal pipe. Only a brush is needed to apply economical PLASJOIN Cement in the field. It sets rapidly, gives a tough, positive, permanent bond.

Available in gallon, quart, pint and half-pint cans, ready-to-use PLASJOIN VC saves mixing time and avoids the hazards of preparation in the field. Rigid controls assure uniform quality from shipment to shipment.

Extensive tests show that rigid vinyl pipe joints cemented with PLASJOIN VC are as strong as, if not stronger than, sections of straight un-"welded" pipe.

PLASJOIN VC Cement is sold by your rigid vinyl pipe supplier.

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 For more data on advertised products, use Readers' Service Cards, last page.

Oil Fuel Submarine Line Completed on West Coast

Pacific Gas and Electric Company has completed the largest submarine fuel oil line on the West Coast, a 24-inch line 4000 feet into the Pacific Ocean from the new Morro Bay steam generating plant near San Luis Obispo, Calif.

The line will carry heavy fuel oil from tankers riding at anchor to storage tanks near the power plant which is scheduled to be in operation next spring.

Canadian Gulf Charters New Pipe Line Subsidiary

The Canadian Gulf Pipe Line Company has been organized and registered under the Saskatchewan Companies Act. The new subsidiary, organized to gather and move production of the Canadian Gulf Oil Company, is already gathering oil from the Frobisher oil field where Canadian Gulf works with Canadian Devonian Petroleum, Ltd.

Arapahoe Line Makes First Crude Deliveries

First shipments of crude oil entered two completed sections of the new Arapahoe Pipe Line in November, marking initial movement in the trunk line system which will run from Merino, Colo., to Humboldt, Kansas, when completed.

The two spreads, totaling 168 miles of 20-inch pipe, are part of five which make up the 479-mile crude line. The entire line, scheduled for operation before the end of the year, will serve the Denver-Julesburg basin and western Kansas. At Humboldt, connections will be available with a pipe line trunk system moving crude into midwestern refining centers.

A total of 25,000 barrels of crude made up the first shipment through the two spreads, built and tested for use in record-making construction from Schurr Station to Humboldt.

Arapahoe is jointly owned by Pure Oil Company and Sinclair Pipe Line Company.

Panhandle Eastern Begins Kansas-Michigan Looping

Contracts have been let and construction is under way on 295 miles of Panhandle Eastern's Kansas to Michigan line, part of a $67 million expansion program.

Construction crews are working at top speed to complete pipe-laying and get additional gas to companies in Illinois, Indiana, Michigan, Ohio and Missouri before cold weather. Completion is scheduled for late December.

Pipe line construction consists of looping the main line with 26 and 30-inch pipe at 12 locations. Included is a double 24-inch underwater crossing of the Mississippi from a point near Louisiana, Mo., to the Illinois side. Pipe for the crossing will be of 1-1/16-inch wall thickness.

Processing Plant, Pipe Line To Be Built in West Pakistan

Pakistan Petroleum Limited has contracted with Hudson Engineering Corporation of Houston, Texas, for the design and installation of a gas gathering system and gas processing plant for the Sui gas field in the state of Baluchistan, West Pakistan. The Sui field has a proven reserve of over two trillion cubic feet.

After treatment in the plant, gas will be piped by way of Hyderabad to Karachi, 350 miles southwest of Sui. Cost of the project, including the pipe line, will run about $30 million. Completion is scheduled for May, 1955.

The Hudson organization already has construction men in Pakistan recruiting native labor crews and studying means of transporting heavy equipment over miles of roadless desert. All plant equipment will be shipped from Houston to Karachi this month.

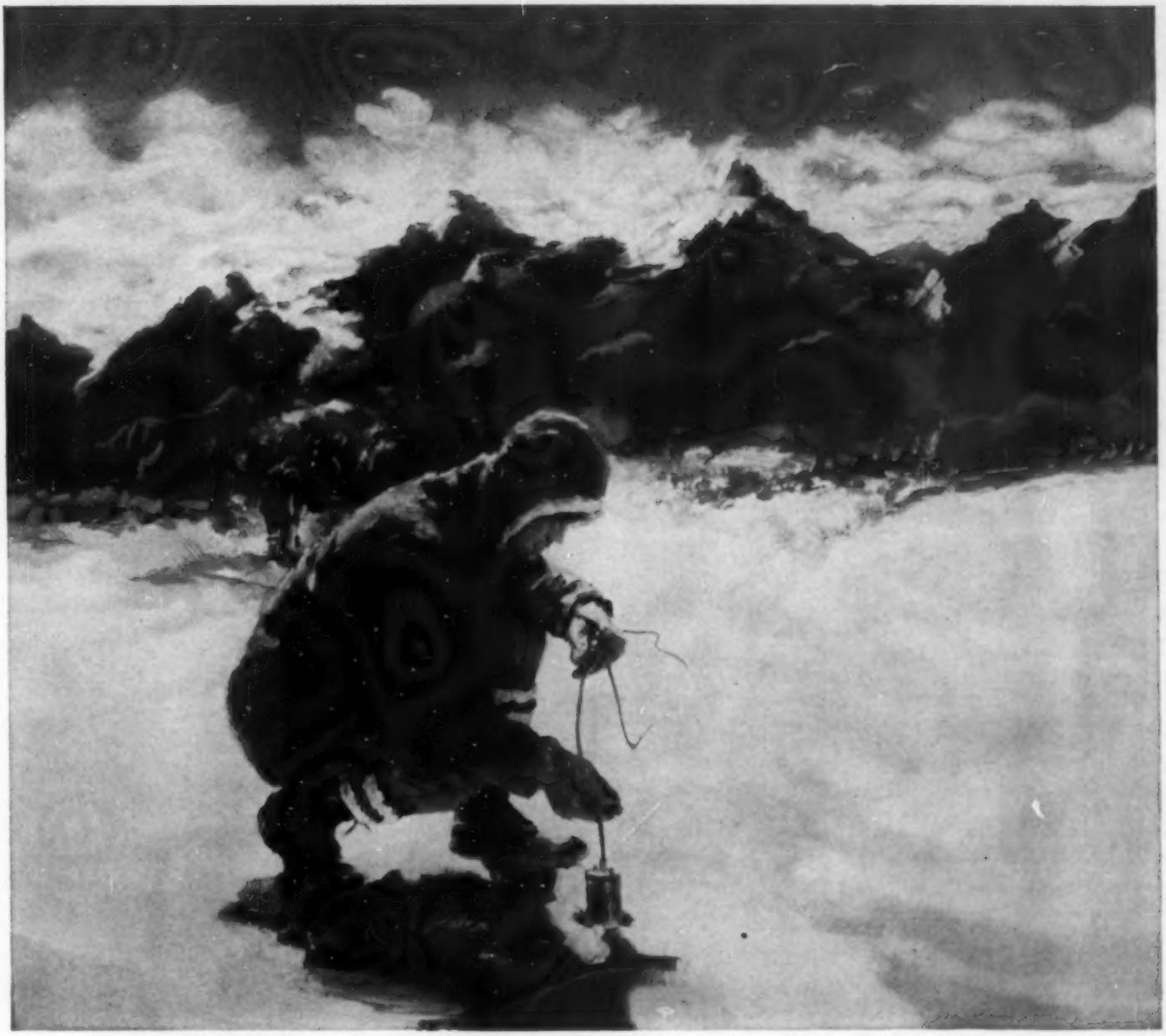
Submarine Crude Oil Line To Be Built at Seal Beach

A submarine pipe line will soon be constructed to carry crude oil from Monterey Oil Company's artificial island 8000 feet to shore near Seal Beach, Calif. Negotiations are under way for the engineering contract.

The company has just announced completion of its second well drilled from the island. At present, oil is being produced into a barge moored alongside the island well site.

Pipe Line Contracts Not Let

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
Alabama-Tennessee Natural Gas Co.—Florence, Ala.	25	8, 12	Gas	Alabama	$808,450	Proposed
American Louisiana Pipe Line Co.—666 Penobscot Bldg., Detroit, Mich.	1,289	22, 30	Gas	North Tepetate, La.—Detroit, Mich.	$130 million	1,172 miles conditionally authorized
American Pipe Line Corp.—New York City (Swinerton & Walberg, Engineering)	1,425+ 485 miles feeders & distribution lines	24, 26	Products	Beaumont, Texas area—Newark, N.J.	$170 million	Out for bids
Anadarko Basin Pipe Line Co.	525	24	Gas	Wise County, Texas—Texas Eastern near Memphis, Tenn.	.....	Planned
Ar-Mex Pipe Line Co.	900	8, 12, 14	Crude	Guernsey, Wyo.—Phoenix, Ariz.	$31 million	Planned
Attock Oil Co.	60	.....	Gas	Dhulian Field—Rawalpindi, West Pakistan	.....	Planned
H. W. Bass & Sons Co.	152	4, 6	Products	Duval and Live Oak Counties—Corpus Christi, Tex.	.....	Planned
California-Oregon Pipe Line System	103	6	Crude	Crescent City, California—Medford, Ore.	$2 million	Planned
Carolina Natural Gas Corp.—701 Wilder Bldg., Charlotte, N. C.	185	2, 12	Gas	North and South Carolina	.....	Proposed
Central Hudson Gas & Electric Co.	48	12	Gas	Albany—Kingston, N. Y.	.....	Applied to FPC
Cherokee Pipe Line Co.	8	.....	Products	Near Wichita, Kansas	.....	Planned
Cheyenne Valley Pipe Line Co.	58	10	Crude	Lance Creek—Fort Laramie, Wyo.	$1,838,241	Proposed
Cities Service Gas Co.—1st National Bank Bldg., Oklahoma City, Okla.	33	20, 26	Gas	To replace lines in Kansas and Missouri	$1,860,000	Authorized
	13	.....	Gas	Labette County, Kansas	$285,000	Authorized
	15.5	16	Gas	Carter County—Garvin County, Oklahoma	$541,050	Authorized
City of Dalton, Ga.	39	8	Gas	To connect with Southern Natural Gas Co. line	$2,940,000	Proposed
Coast Counties Gas & Electric Co.—369 Pine St., San Francisco	40	3, 4, 8	Gas	Coast and Valley region, California	.....	Planned
Colorado Interstate Gas Co.—Colorado Springs, Colo.	365	22	Gas	Rock Springs, Wyoming—Denver, Colo.	$23,299,000	Authorized
	115	4, 6, 8	Gas	Denver-Julesburg Basin—Basin Cities	.....	Before FPC
Colorado Western Pipe Line Co.—Dallas	708	.....	Gas	Southeastern Colorado Fields—Denver plus laterals	$30 million	Planned
	328	16, 18	Gas	LaPlata County—Pueblo, Colorado Springs and Denver	$21,600,000	Authorized
Compania del Oleoducto Buenaventura—Cali, Colombia, S.A.	90	.....	Products	Buenaventura—Cali, Colombia	$4 million	Planned
Dixie Pipe Line Co.	20	8	Gas	Gwinville Field, Mississippi—Transcontinental Gas line	$425,000	Proposed



...it's *Stringtime* in the Rockies

A sure sign that the oil hunters are at work is the seismic string — the "jugs" and cable used in recording shock waves from charges the seismic crews fire as they search for spots where oil might be found. The strings are busy in the Rockies these days and among the busiest are those from Shell Oil Company. The work of the seismic crews is one of the many costly operations undertaken in the continuous exploration for new oil fields — to serve a nation that moves on petroleum.

SHELL

SHELL OIL COMPANY

Pipe Line Contracts Not Let—Continued

COMPANY	Length in Miles	Diameter	Type	Origin and Terminus	Estimated Cost	Status
El Paso Natural Gas Co.—Bassett Tower, El Paso, Tex.	32.5	10	Gas	Reagan and Upton counties, Texas	$799,000	Authorized
	74	.....	Gas	Texas, New Mexico and Arizona	$13,800,000	Proposed
Empresa Nacional del Petroleo	80	6	Products	Concon—Santiago, Chile	.....	Planned
Equitable Gas Co.—420 Boulevard of the Allies, Pittsburgh 19, Penn.	12	Various	Gas	Marion and Wetzel counties, West Virginia	$2 million	Authorized
Glacier Gas Co.	626	16, 20	Gas	Canada—Montana, Idaho and Washington	.....	Planned
Gas Service Co.—Kansas City	12	.....	Gas	To connect with Cities Service Gas Co. line	$650,000	Planned
Governments of Southern Rhodesia and Portuguese East Africa	200	.....	Products	Beria, Portuguese Mozambique—Umtalia, Southern Rhodesia	.....	Considered
Home Gas Co.—Binghamton, N.Y.	32	12	Gas	Breesport—Union Center, N.Y.	.....	Planned
Hope Natural Gas Co.—445 W. Main St., Clarksburg, West Virginia	33	8, 10, 12	Gas	Wyoming County, West Virginia—Buchanan County, Va.	.....	Proposed
Houston Texas Gas & Oil Co.—4604 Main St., Houston	1,542	Various	Gas	Louisiana—Florida	$148 million	Proposed
Idaho Natural Gas Co.—Goodland, Kansas	....	.....	Gas	Pacific Northwest line—points in southern Idaho	.....	Proposed
International Pipe Line Co., Inc.—227 N. Cedar Ave. Minneapolis, Minn.	132	8	Products	Wrenshall, Minn.—Minneapolis Bulk Terminal	$4,250,000	Proposed
Kansas-Nebraska Natural Gas Co.—Phillipsburg, Kans.	221	6-12	Gas	Central and northeast Nebraska	$4,096,890	Some contracts let
Lateral Gas Pipe Line Co.—Cedar Rapids, Iowa	27	4	Gas	Grant—Clarinda, Iowa	$267,000	Proposed
Malco Pipe Line, Inc.	91	6	Products	Prewitt, N.M.—Albuquerque	$1,250,000	Planned
Manufacturers Light & Heat Co.—Pittsburgh, Penn.	51	.....	Gas	13 projects in Ohio, Pennsylvania and West Virginia	$4,099,250	Authorized
Mayflower Pipe Line Co.—(Pine Tree Natural Gas Co.)—70 Pine St., New York, N.Y.	200	.....	Products	New Jersey refining area—New England	.....	Planned
Michigan Consolidated Gas Co.—415 Clifford, Detroit 26, Mich.	25.5	12	Gas	Sparta—Muskegon, Mich.	$13 million	Proposed
Michigan-Wisconsin Pipe Line Co.—500 Griswold, Detroit 26, Mich.	252	4-24	Gas	Wisconsin	$11 million	Proposed
Mid-Saskatchewan Pipe Line, Ltd.	23	8	Crude	Smiley Field—Kerrobert	.....	Proposed
Missouri Central Gas Co.	25	6	Gas	Moberly—Macon, Mo.	.....	Proposed
Missouri Public Service Co.—Warrensburg, Mo.	136.4	8-10	Gas	New Franklin, Mo.—Grundy, County, plus lateral	$5 million	Proposed
Montana-Dakota Utilities Co.—Minneapolis, Minn.	56	2, 4, 6	Gas	Hettinger and Stark counties, North Dakota	$728,854	Authorized
Moore-Stoner Co.	200	6	Products	Glendive, Montana—Minot, N.D.	$2,000,000	Planned
NATO	1,920	4-10	Products	To serve military bases in Western Europe	.....	Foster-Wheeler prime contractors
Natural Gas Pipe Line Co. of America—20 N. Wacker, Chicago	240	24	Gas	Cater, Garvin and Stephens counties—Hutchinson County, Texas	$30 million	Planned
	280	20	Gas	Wise County, Texas—Amarillo, Texas	$1½ million	Proposed
	350	20, 26	Gas	Fritch, Texas—Grady County, Okla.	$32,070,000	Planned
Natural Gas Producers, Inc.—Colorado Springs	100	12	Gas	Yenter Pool—Denver	.....	Planned
Nebraska Pipe Line Co.	220	6	Products	Cheyenne, Wyoming—North Platte, Neb.	$4 million	ODM Certificate Granted
New River Gas Co.	50	.....	Gas	Summers-Monroe Counties, W. Va. and Narrowsa and Dublin, W. Va.	.....	Planned
NNCW Pipe Line Co.—Dallas, Texas	127	8, 10	Crude	Clareton Field—Casper, Wyo.	$3.6 million	Planned
North Dakota Natural Gas Co.—St. Paul, Minnesota	500	6, 10, 12	Gas	Tioga-Minot, Fessenden, Devils Lake and Fargo, North Dakota plus 6" feeder lines	$10.8 million	Proposed
Northern Indiana Fuel & Light Co.—Auburn, Ind.	35	10	Gas	Edgerton—Auburn, Ind.	$876,814	Planned
Northern Natural Gas Co.—2223 Dodge St., Omaha, Neb.	167	24	Gas	Farmington, Minn. to Duluth, Minn. and Superior, Wisconsin	$12 million	Before FPC
	329	2, 12	Gas	Sioux Falls to Aberdeen, S.D.	$6,661,100	Proposed
	310	24	Gas	Tioga to Fargo, North Dakota	$18,494,000	Planned
	....	.....	Gas	To interconnect with Natural Gas Pipe Line	$244,000	Planned
Northwestern Utilities, Ltd.—10124-104th St., Edmonton, Alberta, Canada	42	12	Gas	Bonnie Glen—Edmonton, Alberta	$1.4 million	Proposed
Ohio Fuel Gas Co.—Columbus, Ohio	46	20-24	Gas	Jackson, Vinton, Hocking and Fairfield Counties, Ohio	$3,832,700	Authorized
	28	.....	Gas	Various Ohio Counties	$832,700	Authorized
Orchard Pipe Line Co.—Denver, Colo.	45	8	Crude	Orchard—Merino, Colo.	$811,000	Planned
Pacific Northwest Pipe Line Corp.—M&M Bldg., Houston	1,466 plus 443	Various	Gas	San Juan Basin—Pacific Northwestern states	$160 million	Approved
Panhandle Eastern Pipe Line Co.—Kansas City, Mo.	575	30	Gas	Kansas—Michigan	$67 million	295 miles under construction
Pecos Growers Gas Co.	98	8, 12	Gas	Grandfalls, Texas—Reeves County, Texas	$2,500,000	Has ODM write-off
Petroargentina	370	16	Crude	Newguen—Bahia Blanca, Argentina	$40 million	Planned
Petroleos Mexicanos—Ave. Juarez, 94, Mexico City	440	20	Gas	Brazil-Tampico-Poza Rica, Mexico	.....	Planned
	260	6, 8	Products	Lagos, Mexico—Guadalajara, Aguascalientes and Salamanca	.....	Planned
	145	12	Crude	18 de Marzo Field—Monterrey, Mexico	.....	Considered
	72	12	Crude	Poza Rica—Atascapotzalco, Mexico	.....	Proposed
Phillips Petroleum Co.—Bartlesville	54	6	Products	Goldsmith—Borger, Texas	.....	Planned
Pine Tree Natural Gas Co.	204	8, 10	Gas	Boston area—Bangor, Maine	.....	Planned
Pittsburgh Consolidated Coal Co.	100	.....	Coal	Cadiz, Ohio—near Cleveland, Ohio	$10 million	Planned
Powder River Pipe Line Co.—Casper, Wyo.	52	6, 8	Crude	Salt Creek and Casper, Wyo.	.....	Planned
Progress Pacific Pipe Line Co.—530 W. 6th St., Los Angeles	1,100	24	Crude	Odessa, Texas—Los Angeles Harbor	.....	Planned
Santos Jundiai Railway Co.—Brazil	....	8, 14, 22	Crude & Products	Expansion of Santos-Sao Paulo system	$4 million	Planned
Shenandoah Gas Co.—Lynchburg, Va.	40	3, 4, 8	Gas	Virginia Gas Transmission Co. System—Virginia and West Virginia towns	$1,470,000	Authorized
Standard Pipe Line Co.	350	16	Crude	Glendive, Montana—Guernsey, Wyoming	.....	Planned
	330	16	Crude	Wink, Texas—Albuquerque, N.M.	.....	Planned
Sturgeon Pipe Line Ltd.	100	12	.....	Sturgeon Lake Field—Trans-Mountain system	$6,500,000	Planned
Sunflower Pipe Line Co.—Tulsa, Okla.	265	3-6	Products	Kearny, Grant and Haskel Counties, Kansas—Wichita, Kansas	$3½ million	Authorized
Tennessee Gas Transmission Co.—Box 2511, Houston	50	10	Gas	Nueces County, Texas	.....	Proposed
	243	24	Gas	Hebron Storage Field, Pennsylvania—Greenwich, Conn.	.....	Proposed
Texas Eastern Transmission Corp.—Texas Eastern Bldg., Shreveport, La.	481	16, 24, 26	Products	Reconvert "Little Big Inch" line and construct 382 miles of additional line	$7,114,000	Proposed
Texas Gas Corp.—Shreveport, La.	3.5	12	Gas	Sabine River crossing to join Transcontinental Gas Pipe Line	.....	Authorized
Texas Gas Transmission Co.—416 W. 3rd St., Owensboro, Ky.	48	26	Gas	Lake Cormorant, Mississippi—Slaughter, Ky.	$4,281,135	Authorized
Trans-Canada Pipe Line, Ltd.—Calgary, Alberta, Can.	2,240	30, 36	Gas	Alberta—Eastern Canada	$297 million	Approved
Transcontinental Gas Pipe Line Corp.—3100 Travis St., Houston	....	.....	Gas	Connecting facilities with Texas Eastern Penn.—Jersey in Pennsylvania and New Jersey	$131,628	Authorized
	533	30, 36	Gas	Paralleling portions of Texas-New York line	$80 million	Proposed
	25	12	Gas	Cameron and Calcasieu parishes, Louisiana	$1,076,000	Proposed
Trans-Northwest Gas, Inc.	246	.....	Gas	Osoyoos, B.C.—Washington and Idaho, plus 275 miles branch lines	.....	Planned
Triangle Pipe Line Co.	560	12	Products	Arkansas City, Ark.—Covington, Ky.	$24½ million	Proposed
Union Oil Co. of Canada, Ltd.—Chatham, Ontario	180	24	Gas	Dawn Gas Field to Lambertcn County to deliver gas to Dominion Gas Co.	.....	Planned
United Fuel Gas Co.	13	12, 20	.....	West Virginia	.....	Before FPC
U. S. Army Corps of Engineers	600	10	Products	Under study to supply naval and air bases in Spain	$16 million	Planned
U. S. Navy	450	8	Gas	Gubik Field—Fairbanks, Alaska	$20 million	Planned
Utah Natural Gas Co.	40	10	Gas	Orem—Salt Lake City, Utah	.....	Planned
Virginia Natural Gas Co.	153	.....	Gas	Buckingham—Richmond and Portsmouth, Va.	.....	Planned
West Coast Pipe Line Co.—Mercantile Bank Bldg., Dallas	960	24, 26	Crude	Wink, Texas—Norwalk, Calif.	$106,000,000	Planned
Williston Basin Pipe Line Co.—Insurance Bldg., Omaha	244	8	Products	Billings and Laurel refineries—Glendive, Mont.	.....	Out for bids
Wyoming Gas Products Corp.	....	.....	Gas	Gathering system in Weston County, Wyoming, to feed gasoline plant	.....	Planned
Yacimientos Petroliferos Fiscales Bolivianos	170	4	Crude	Bermejo—Tupinza, Bolivia	.....	Planned

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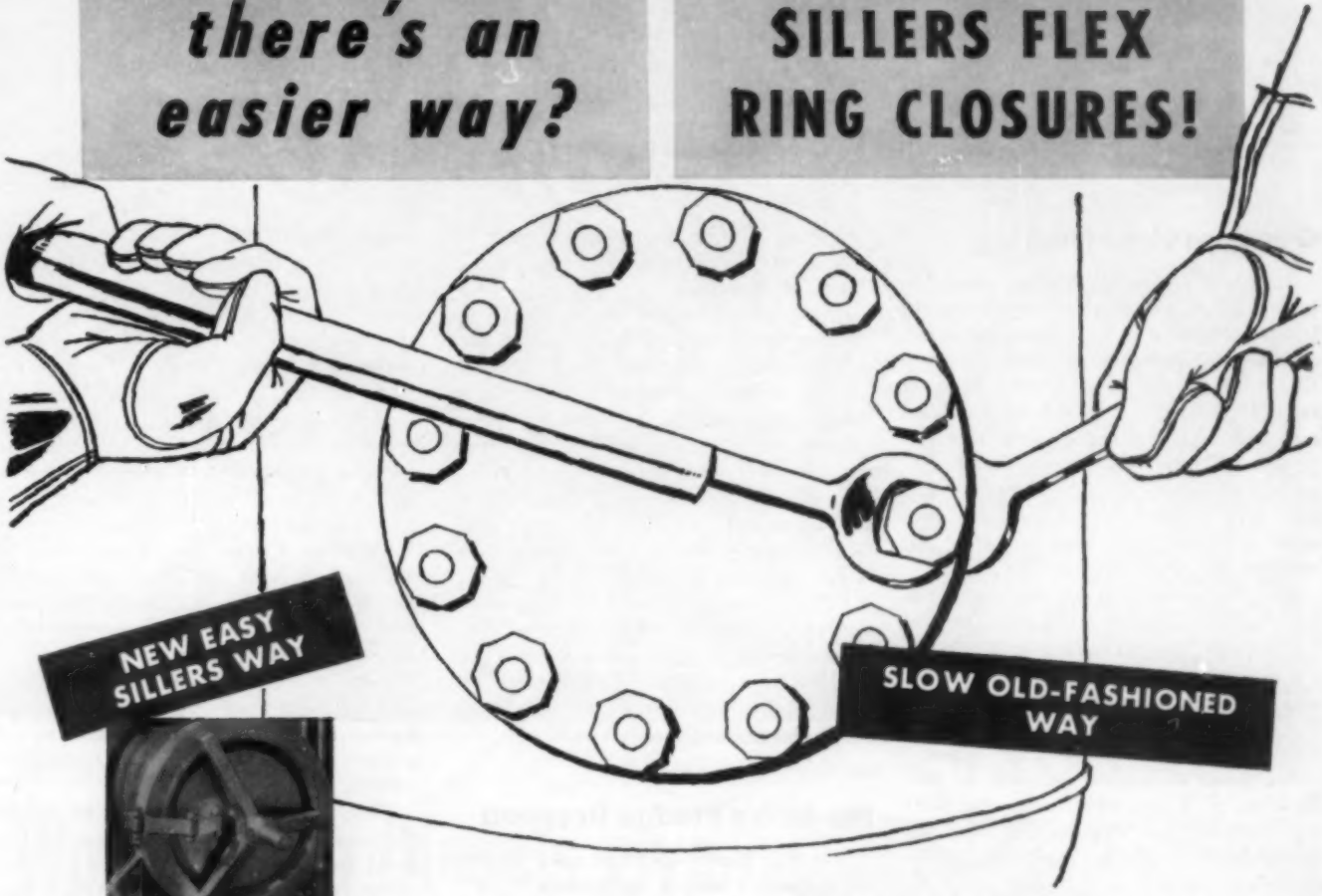

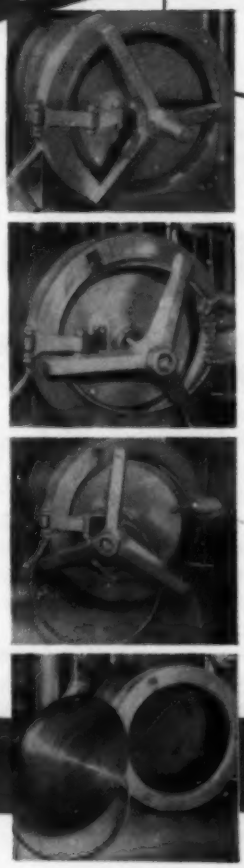

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PIPE LINE INDUSTRY'S VIEWS OF THE NEWS

- Ranks closing for gas fight . . . • OWIU reloads its gun to win wage increase . . .
- Public views oil as 'nice monopoly' . . . • Texas ups allowable to hold markets . . .
- U. S. royalties up $7 million . . . • Industry wary of depletion allowance attack . . .

Gas Case Fight Nearing

Industry was grimly closing ranks last month for a now-or-never assault on the lethal octopus of federal gas regulation.

Superficially, there was cause for optimism that the Supreme Court's mandate in the Phillips case could be legislated into limbo. Congressional intent to interpret the Natural Gas Act has ever leaned toward industry, as attested by the fact that oil's cause has been espoused four times by the House of Representatives and twice by the Senate.

The Senate majority leader under the new alignment will be Lyndon Johnson of Texas, who labored heroically for industry in the 1950 ruckus over the Kerr Bill, and who told the Mid-Continent Oil and Gas Association just last October 7: "The court's ruling is wrong. Shockingly wrong."

The House majority leader will be Sam Rayburn of Texas, who during the Kerr Bill hassle dropped his gavel and descended to the floor to stiffen the ranks of industry's adherents.

And perhaps most important, in the light of the lesson taught by turn-tail Truman, who vetoed the 1950 bill, President Eisenhower has said repeatedly that he wants less federal meddling in state affairs. More tangibly, he has directed his National Fuels Resources Committee to study implications of the Phillips decree.

Nevertheless, there was no optimistic hooting from the crown block last month. There have been paper victories many, many times before. But the octopus of federal regulation clutches tighter than ever the throats of the independent gas producers.

The opposition will be determined and strong. Senators Estes Kefauver of Tennessee and William Langer of North Dakota are ready to ask for a $1 million appropriation to investigate "monopolies," including the oil and gas industries.

In a bitter attack on the FPC, which sides with industry against the High Court's ruling, Kefauver recently said he would ask the Senate anti-monopoly subcommittee "to get the fact" on the Commission's "failure" to suspend rate increases by independent natural gas producers which became effective November 1.

"What the decision amounts to is a further breakdown of regulation devised to control an essentially monopolistic industry, the field producers of oil and gas which are dominated by a handful of financial interests."

Though Kefauver is a power in the Senate, the significance of his attack does not lie solely in the votes he could muster on the ordinary, routine measure. More important is that he is politicking. He is talking for the press and the vast army of consumers who have the deluded notion that, as Kefauver says, "Gas rates to consumers will be up all over the country and the poor consumer will never know what hit him."

Others, regardless of their convictions, can be expected to follow Kefauver's example if the issue becomes enflamed as in 1950, when many a Congressman deserted the gas industry's side for fear of having his political pants burned off.

No-Strike Pledge Dropped

The Oil Workers International Union-CIO reloaded its gun last month.

Last June 4 the union made a no-strike pledge during the campaign for a 5 percent wage hike because "our employers have told us they resent having to bargain with a loaded gun on the table, by which they meant they resent bargaining under pressure of strike threats."

Local bargaining teams have now been notified to advise oil companies that the union will strike if necessary to win "a general wage increase of 5 percent or its equivalent."

The union declared that "we can only regretfully conclude that the oil industry is taking advantage of our pledge not to strike." It said wage increases have been flatly refused by all companies, with a few minor exceptions. "There have been no general wage increases granted in the industry."

Word of the new policy came within five days after another announcement to the effect that OWIU has fixed February 25 as the date for a Cleveland convention to vote on a merger with the Gas, Coke & Chemical Workers—CIO. OWIU said both unions would meet three days later in Cleveland in a joint merger convention.

The two announcements—on wages and mergers—were apparently unrelated, but recent events indicated otherwise. The Gas, Coke & Chemical Workers have of late viewed the merger with less enthusiasm. The reason: Dave McDonald's CIO steel workers reportedly offered them a million-dollar organization fund to turn their back on OWIU and sign up with the steel workers. Shortly after that report, the Gas, Coke & Chemical workers suddenly abandoned plans for a September merger meeting with OWIU. This was widely interpreted as a stall to give the Gas, Coke & Chemical Workers time to weigh the steel workers' offer.

Moreover, OWIU has all but failed in its drive to draw AFL and independent unions into a proposed coalition. Of the more than 20 unions which attended the original coalition organization meeting last spring, only OWIU has ratified the plan. The rest have held back, apparently fearing they will lose their autonomy in a coalition with the big 120,000-member OWIU.

Thus, by threatening to strike unless given a 5 percent wage increase, OWIU could have been lifting a battle pennant under which the other unions—Gas, Coke & Chemical along with the AFL and independents—could be lured with the promise of booty for all.

'Nice Monopoly'—That's Us

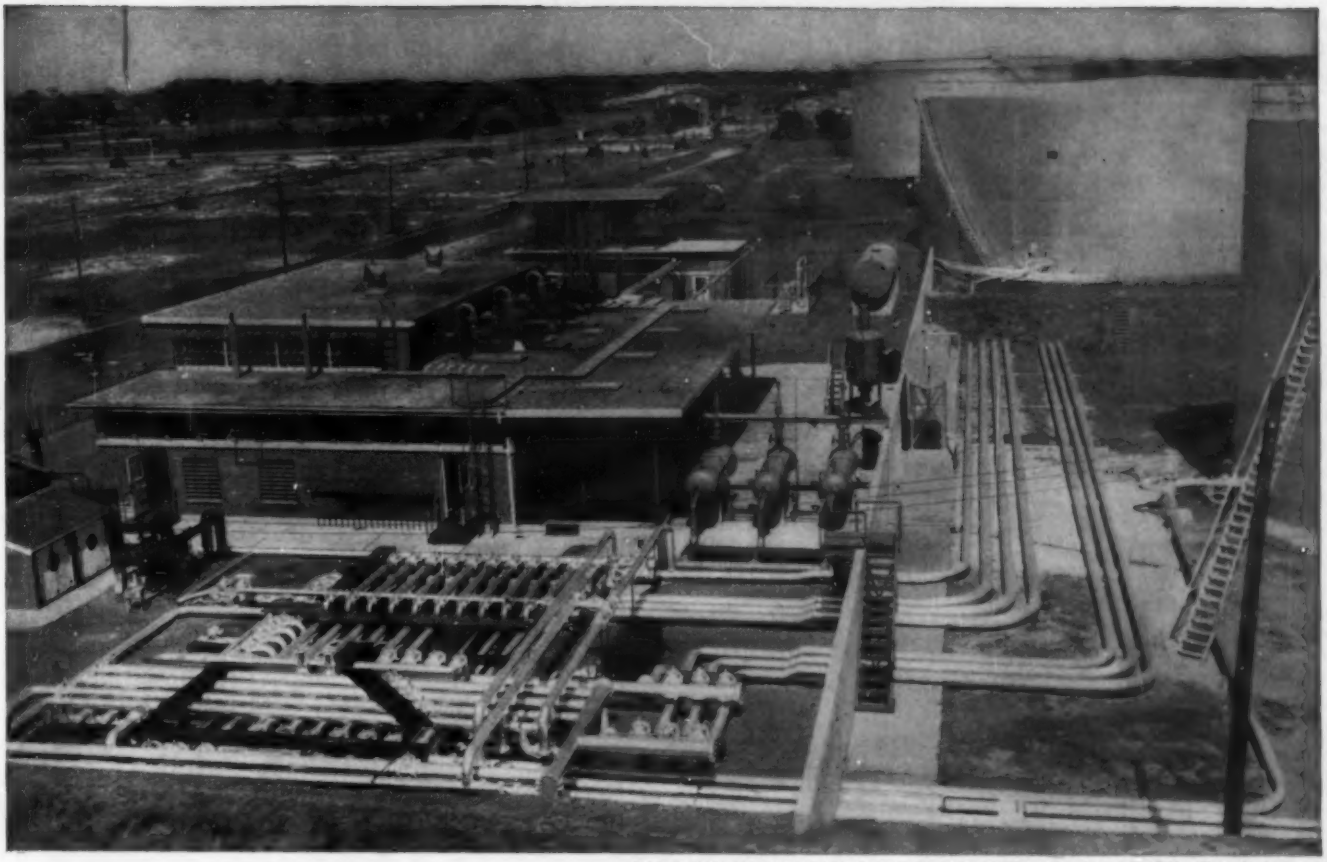
The U. S. oil industry is one of the nicer monopolies.

This public conception of our industry was revealed once more at the hard core of the progress report delivered at the Chicago API meeting by G. Stewart Brown, outgoing chairman of the Oil Industry Information Committee.

Thus, if it is conceded, as it must be, that the odious "monopoly" brand is responsible for many of industry's ills, it is apparent that our progress, public relations wise, is in being advanced from "monopoly" to "nice monopoly." Industry is run by a group of giants, the public holds, but fortunately they are civilized giants who don't starve little children by cutting off the gasoline supply of milk trucks.

Brown reported on the findings of Dr. Claude Robinson, president of Opinion Research Corporation, retained to make an "impartial outside evaluation" of the OIIC program. Robinson found this:

"Despite rising criticism of gasoline



WORTHINGTON DIESEL-EQUIPPED PUMPING STATION of the Southeastern Pipeline Company at Blountstown, Florida, 30 miles north of Port St. Joe.

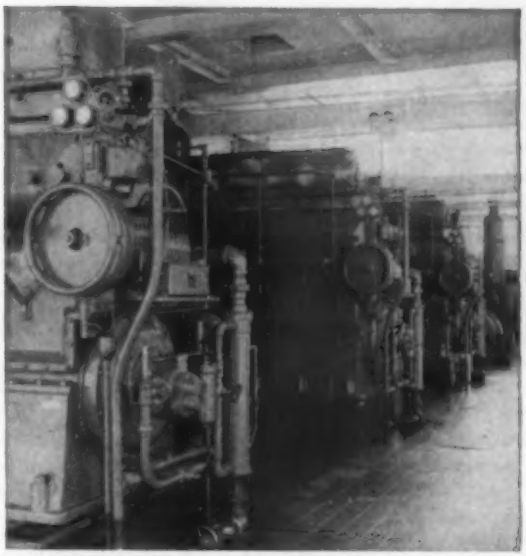
Worthington Diesels give "Eleven years of almost continuous operation"

• That's what the Southeastern Pipeline Company writes about the dependability of their six Worthington Diesels.

The engines are used to drive Worthington pumps which deliver gasoline and kerosene from Port St. Joe, Florida, to Chattanooga, Tennessee. They've been running almost continuously for eleven years with extremely low fuel consumption and maintenance costs.

This company's long satisfactory experience with the dependable Worthington Diesels has been duplicated by pipeline companies everywhere. Learn how Worthington engines, engine-starting compressors, oil transfer pumps, cooling water circulation pumps and evaporative type engine water coolers can help you in your operation too.

Write for more facts to Worthington Corporation, Engine Division, Section E.3.5, Buffalo, N. Y.



IN HEAVY-DUTY OPERATION SINCE 1942, these three Worthington Diesels at Southeastern's pumping station in Blountstown, Florida, and three at Port St. Joe, Florida, furnish all the power for driving the main pumps in these stations.

E.3.5

WORTHINGTON

Economical Continuous Power—Diesel, Dual Fuel, and Spark-Ignition Gas Engines, from 190 to 2100 bhp.

prices, the over-all favorable impression of the oil industry has risen from 69 to 72 percent between 1946 and 1953."

Robinson also found: "The OIIC has succeeded in making the public more conscious of competition in the industry. A large majority, however, still believe that a few big companies dominate the oil industry and that this is not good."

In a frank appraisal that showed a commendable grasp of industry's basic problem, Brown cited three shortcomings in the OIIC effort:

- The committee has been too modest in asking industry for enough money and manpower.
- OIIC has been using a shotgun to hit all targets instead of a cannon to knock over the big ones.
- OIIC has been slow to enlist greater participation from more segments of the industry. "Most of our volunteers come from the marketing side of the indstury, which is fine. But we need more representation from producing, manufacturing, research and other important parts of the industry. This is something we intend to work on next year."

Information Program Set

So the public can be given information on the development of adequate natural gas and oil resources, an information program will be conducted by the new Natural Gas and Oil Resources Committee, which will be headquartered in New York City.

Committee chairman is L. F. McCollum, president, Continental Oil Company; vice chairman is Paul Kayser, president, El Paso Natural Gas Company. Baird H. Markham, former American Petroleum Industries Committee director, will serve as the committee's full-time director.

Thanks to construction during the past few years of many long distance transmission lines from Mid-Continent and Southwest fields, natural gas is being used by many new consumers unacquainted with problems confronting the development of new supplies necessary to meet growing demands, McCollum said.

Consequently, he added, new consumers as well as others are entitled to know the facts regarding their future gas supply. Toward that end, the committee plans to present the facts to interested groups throughout the U. S., in addition to the public at large.

Texas Allowable Upped

The Railroad Commission decided last month that it's futile to cut back Texas production so long as other regions remain eager to supply the market with the difference.

"Other areas have been taking the Texas market," noted Commissioner Olin Culberson. "Perhaps we have given too much weight to nominations, without regard to the economic effect on producers and royalty owners." Result: The Commission raised the December allowable 64,374 barrels daily. This month's quota, based on 16 days' production, will average 2,961,782 barrels daily. Assignments to new wells will increase the amount by about 35,000 barrels daily.

Six majors recommended the 16-day schedule for the 31-day month. By comparison, the schedule for 30-day November was for 15 days.

Reports to the Commission showed U. S. imports of crude and products to be 917,442 barrels daily for October. Schedules for November called for an average of 1,033,433 barrels daily, and for December, 1,048,047.

Monument to Conservation

Last month at Oklahoma City a monument was dedicated to oil's cherished, half-won principle of sensible conservation without the blight of federal intervention.

The monument is a $75,000 building to house the Interstate Oil Compact Commission. Built with funds provided by a legislative appropriation from funds built up by taxes on oil and gas production, the one-story brick and stone structure was deeded, along with the land it occupies, to the Compact for as long as its offices remain on that site.

Just the right note was struck at the dedication ceremonies by S. L. Digby, member of the Federal Power Commission who has been hammering away at the shackles which the Supreme Court forged in the Phillips gas case. Digby aptly paraphrased the Compact's aims thusly:

"The matter of regulation in the interest of conservation is the right and responsibility of the respective states. Any encroachment upon this right by the federal government will prove to be harmful to the public interest."

To Study Pipe Line Need

A non-oil committee was named last month by the Office of Defense Mobilization to study a proposal for a government-backed crude line from Texas to California.

Charles S. Cheston, Philadelphia industrialist; Palmer Hoyt, Denver publisher; and Charles A. Thomas, chemical company executive, were appointed to assess the problem of petroleum transportation to the West Coast, the availability of crude and products for military use in the Pacific, and to analyze the capacity of refineries in the area to meet emergency requirements.

The group was not expected to take up any new problems, but to evaluate previous reports, including recommendations by the Oil and Gas Division and the military, which had found that a Texas-California line would be desirable in an emergency. Neither, however, advocated government aid.

Oil men were left off the committee because ODM wanted to avoid possible charges that the findings were dictated by oil interests.

Westbound Traffic Only!

For the petroleum industry, increased international oil trade traffic from one direction and a congestion of new refining capacity at the other is resulting in a one-way operation.

Already dwindling U. S. oil exports soon will be entirely choked from the trade lanes. Though never a big factor in world petroleum export markets, the U. S. until 1948 was able to more than offset its crude oil and residual imports by shipments of refined products, mostly to Europe, and export of a small volume of crude oil primarily to eastern Canada.

Construction of new refinery capacity abroad in the postwar years, first in the Middle East and more recently in Western Europe, has resulted in a more than ample supply of finished oil products in the Eastern Hemisphere. Western Europe, which only produces 2.5 percent of its crude oil needs, in 1953 became a net exporter of refined petroleum products. The region's export shipments of products only amounted to an average of 24,000 barrels daily in that year, but for 1954 the average is estimated at 100,000 barrels per day, of which 80,000 barrels daily is gasoline. The growth of net European exports can be expected to continue.

The salient statistics of European refinery growth are reported in the fourth survey of the Oil Committee of the Organization for European Economic Recovery, a growth that has been financed in a small part by loans and grants from the U. S. Government, a larger extent by investments of U. S. international oil companies abroad and still a greater extent by European capital investments in new petroleum refining capacity.

Figures cited in the study place total refining capacity of OEEC nations—all of Western Europe, plus the United Kingdom—at the end of 1953 at 2,008,000 barrels daily, a gain of 366,000 barrels daily since the end of 1952. Additional expansion, now under way or planned, will increase the OEEC nation's total petroleum refining capacity to 2,246,000 barrels daily by the end of 1956, according to the report. Of the total crude throughput capacity expected by the end of 1956, 480,000 barrels daily will be cracking capacity and 360,000 barrels daily will be catalytic cracking capacity.

The growth of refining capacity in Western Europe is the result of a need to

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1953: 269 miles in 120 calendar days!
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reduce dollar expenditures for refined products imports which had been supplied largely by American companies and to replace them with lower cost crude imports from sterling producing areas, primarily the Middle East.

In addition to the expansion in European refinery capacity, important refinery expansion programs are under way in Australia, India and Pakistan. New capacity has been completed in 1954 in South Africa and at Aden on the Red Sea.

Stock Edict Appealed

Richfield Oil Corporation, Los Angeles, has appealed a National Labor Relations Board edict to the effect that it must bargain with the CIO Oil Workers on an employe stock-purchase plan already in existence. The appeal now is in the U. S. Circuit Court of Appeals. Richfield lawyers said they would follow "all the due processes of law available" to try to have the NLRB ruling reversed. So the issue may ultimately wind up before the Supreme Court.

The board's 3-to-1 decision was made October 19, serving notice on industry that, once companies contribute to union employe stock-purchase plans—as did Richfield—the plans become part of contractual "wages and working conditions."

The labor board's decision held that Richfield, by refusing to negotiate the issue with OWIU Local 128 at Long Beach, was guilty of an unfair labor practice.

These viewpoints on the matter were voiced by NLRB, management and its lawyers, and the union:

- NLRB—majority opinion held that "it is now well established that the term 'wages' comprehends all emoluments of value which may accrue to employes out of their relationship" . . . and . . . "in our opinion, a stock-purchase plan of the character before us is embraced by this statutory term of the Taft-Hartley Act . . ."
- Richfield—the company argued that neither wages nor working conditions were issues because participation in the plan "is neither a condition of hiring nor a condition to continued employment; both the employer and employe may withdraw at any time."
- Union—Chief O. A. (Jack) Knight said, "We do not consider this a new gain, but rather a re-confirming of a basic bargaining right we have had for many years and which we have exercised on many occasions with many employers."

He included in this category Sinclair Oil Corporation, Socony-Vacuum Oil Company, The Atlantic Refining Company, Continental Oil Company, The Pure Oil Company, and Standard Oil Company of California.

"There is no indication that managements of these companies have been crippled by such negotiations," said Knight.

In brief . . .

The Supreme Court upheld, in effect, the validity of franchise and excise taxes imposed by the state of Tennessee on Texas Gas Transmission Corporation. The High Court refused to review a decision of the Tennessee Supreme Court against the company. The Tennessee court had held that taxes were levied on the privilege of doing business in the state, not on interstate business.

•

Humble Oil & Refining Company was the first of 17 high bidders for oil and gas leases on 83 federal land tracts off the coast of Louisiana to receive a fully executed contract for exploration under the Outer Continental Shelf Act of 1953, the Interior Department announced.

•

Tide Water Associated Oil Company stockholders approved a recapitalization plan. Under the plan, stockholders other than those of Mission Development Company, Mission Corporation and Pacific Western Oil Corporation are being given the opportunity until December 8 to exchange, on a share-for-share basis, all or any part of their common stock holdings for $1.20 cumulative preferred stock of $25 value.

•

A new Office of Strategic Information has been set up in the Commerce Department to promote voluntary efforts to prevent strategic data from reaching foreign nations. Commerce said censorship is not intended.

•

Coastal Terminals of North Carolina, Inc., purchased 27 acres at Wilmington, N. C., for construction of a 175,000-barrel deep-water terminal scheduled for completion in four or five months. An ultimate outlay of $500,000 is expected.

•

Sixty-two pipe line firms with annual operating revenues of more than $500,000 each, reported transportation revenues totaling $139,873,063 for the third quarter. This was a .4 percent increase over the 1953 third quarter.

•

Service Pipe Line Company claimed a record with the completion of a 630-mile crude line from Fort Laramie, Wyo., to Freeman, Mo. The 20-, 22- and 24-inch line was completed in 61 days for an average of ten miles of pipe laid per day. Line was laid by Western Pipe Line Company, of which Service is parent. Initial capacity is 178,000 barrels per day.

Kerr-McGee Bids Released

The U. S. government has returned to Kerr-McGee Oil Industries, Inc., $2,932,800 which the company put up when it filed the wrong bids on federal oil lands in the Continental Shelf off Louisiana.

The bids were submitted at the government's first outer continental leasing sales October 13. On the following day, Kerr-McGee discovered it had made an error in describing the desired parcels.

Return of the one-fifth deposit required for bidding on the nine disputed oil and gas leases followed a holding by Acting Comptroller General Frank H. Weitzel that ". . . It is a fundamental principle of law that the acceptance of a bid with knowledge of an error therein does not constitute a valid and binding contract . . ."

U. S. Royalties Up $7 Million

The U. S. netted almost $7 million more in 1953 from royalties on oil and gas leases on federal lands than in 1952, the Interior Department reported.

Royalty returns last year were $38,192,300, compared with $31,586,400 in the previous year.

Production from federal lands in 1953 included almost 112 million barrels of oil, 239 billion cubic feet of gas, and 207 million gallons of gas liquids. At the close of 1953, there were 85,873 leases outstanding on federal lands, of which 2924 were productive. The drilling record for the year was 755 producers and 414 dry holes.

Depletion Allowance Attack?

Ever sensitive to flank attacks on the depletion allowance, industry was turning a hard, cold stare on Treasury Department questionnaires last month.

The Mid-Continent Oil & Gas Association warned its membership that " . . . the Internal Revenue Service is now engaged in collecting depletion statistics from all taxpayers whose income consists of 'receipts from mineral extraction,' including oil and gas companies and operators."

The Association then threw up its defense: "Since there appears to be no doubt but that the Internal Revenue Service is assembling these depletion statistics for the purpose of making recommendations of some nature to the Congress, it is the feeling of the Association's Special Depletion Committee that identically the same information as is provided to the Internal Revenue Service by oil and gas operators should be made available in a confidential manner . . . to the Association."

The Association plans to study the totals in the hope of determining what Treasury is up to.

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First, what is it? It is a completely metallic rope made with a separate wire rope as a core, instead of the usual fiber core.

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Red-Strand steel core rope answers the problem of crushing when rope is spooled in multiple layers on small diameter drums and winches—or when heavy loads are dragged or pulled. It also resists the damaging effects of excessive heat.

Where is it used? For extra strength and to resist heavy load pressure: on shovel and draglines—for drag, hoist, crowd and frequently boom ropes; on dredges, trench hoes, cranes and similar heavy duty equipment. To resist crushing: on bulldozers, scrapers, coal cutters, coal loaders, logging, arch and choker lines, and on rotary drilling lines. To resist excessive heat: on hot ladle cranes.

Which make should you use? Red-Strand steel core wire rope is highly recommended by its users for its higher-than-rated quality and longer-than-expected service. That saves money.

What's the next step? Talk to your Leschen distributor or Leschen field man. They're well qualified to answer your specific questions about Red-Strand steel core wire rope—or to help solve other wire rope problems. That means profit for you.

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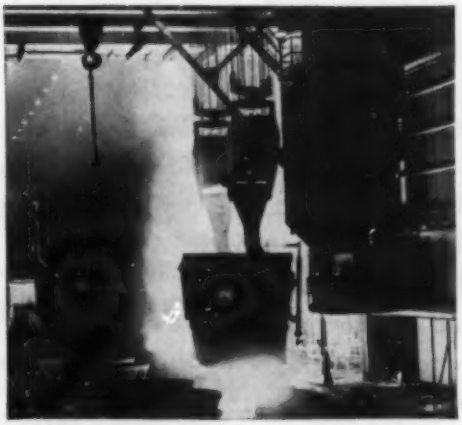

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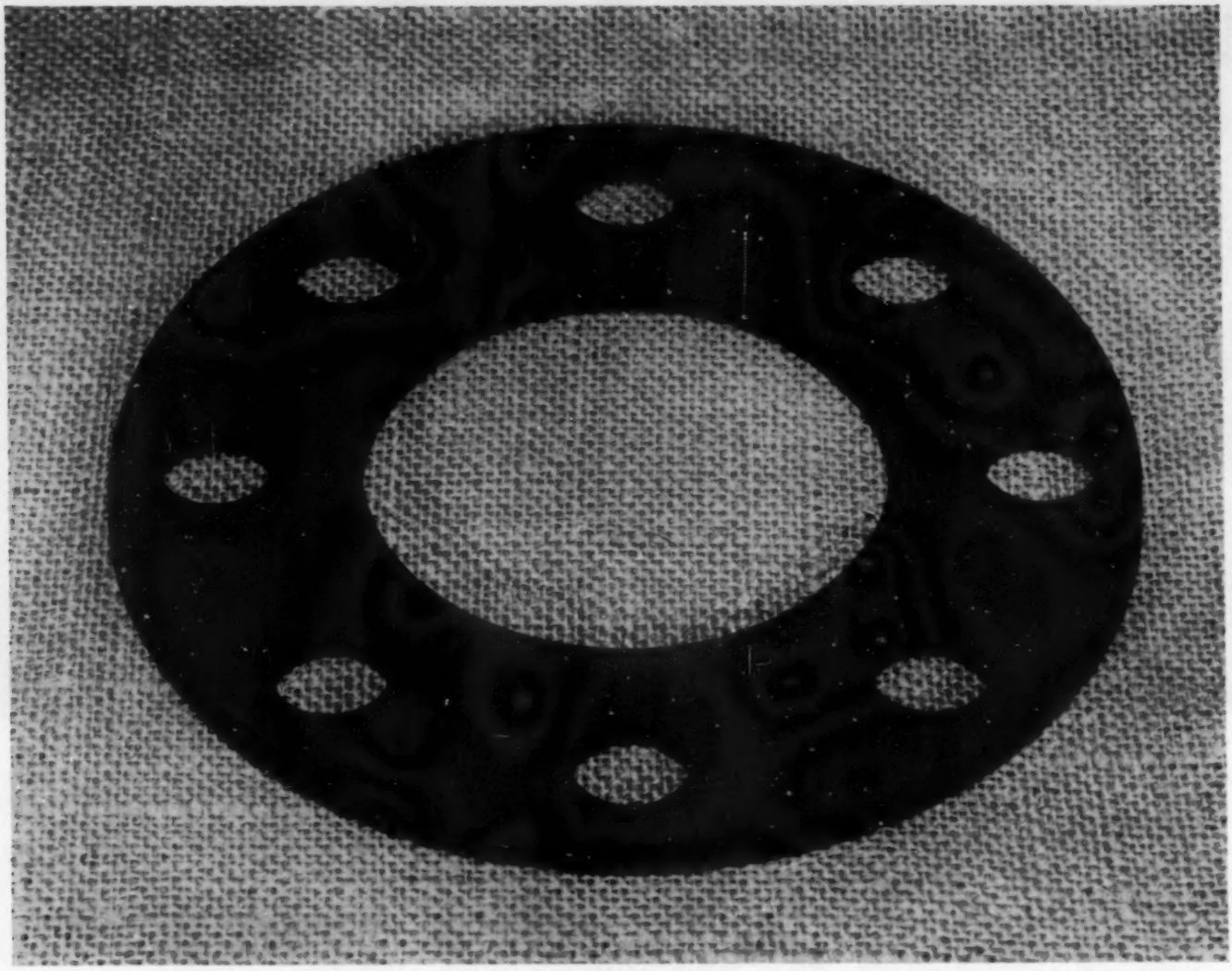

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Pipe Line Men

IN THE NEWS

E. E. Miller

B. R. Keller

L. W. A. Campbell

Three organizational changes have been announced by **Tennessee Gas Transmission Company. E. E. Miller** has been promoted to general superintendent with supervision over compressor, pipe line, gas control, measurement, corrosion control and communication activities. **B. R. Keller** and **L. W. A. Campbell** have been named assistant chief engineers, working under direction of Chief Engineer **E. S. Murray.**

Miller was with Iowa-Nebraska Light and Power Company from 1930 to 1944, the last seven years as general gas superintendent. He joined Tennessee Gas in 1944 and helped build the original pipe line from South Texas to West Virginia. He assisted also in the formation of the company's first Gas Measurement department. He was named supervising engineer in 1948, and, the next year, went to New England in charge of engineering and construction of the pipe line system of a company subsidiary which is now a part of the Tennessee Gas system. He was made assistant chief engineer in 1951.

Keller joined Tennessee Gas in 1943, helped build the original pipe line and, since 1951, has headed the mechanical engineering section of the Engineering department. Campbell joined the company in 1947, serving as engineer and district pipe line superintendent. He has supervised construction or enlargement of many of the company's compressor stations.

Jay Davis Jr., and **J. A. Millen** were elected vice presidents of **Southern Counties Gas Company** following action by the utility's board of directors in Los Angeles.

Davis will be in charge of gas system construction and distribution, building construction and maintenance, and technical and engineering services. Millen will head the company's transmission and compression system—including the Texas-California pipe line—and will represent the company in gas supply and purchase matters.

Davis has held various field and administrative posts in Southern Counties' Santa Monica Bay, San Gabriel Valley, and Santa Barbara County divisions. In 1949 he was appointed assistant to the vice president and in 1953, manager of construction and distribution.

Millen, after working for Southern California Gas Company in various engineering and administrative positions, joined Southern Counties Gas Company in 1947 to head the just-formed Texas-California pipe line division. He was promoted to manager of transmission and supply in September, 1952.

•

John W. Kirstein has been named field superintendent of gathering lines for **Natural Gas Pipe Line Company** of America. He succeeds **L. D. Williams,** who retired. Kirstein, who joined the firm in 1940, has done extensive work in soil erosion prevention and cathodic protection.

•

Union Oil Company has announced the election of **Elmer H. (Buck) Weaver** as vice president. During the past year, he has been on loan to the U. S. government as assistant director, Office of Defense Mobilization, in charge of critical materials and stockpiling. Manager of Union's Purchasing department for many years, Weaver was made director of procurement and contracts upon his return from Washington. He joined Union in 1918 as a buyer.

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HOT DOPE

Straight from the Kettle on *PIPE PROTECTION*

★

By Boyd Mayes

• Recently saw about the most interesting map of the Gulf Coast that I reckon anybody would care to see. While it didn't highlight the towns and vacation spots—it was lit up like the old fashioned Christmas tree with red lines and dollar marks. Every red line was an important deal to all of us—because every line on that map represented the pipelines running in every direction from Texas and Louisiana . . . and represented literally barrels of dough! Yes, sir, pipelining is really big business, and it sure gave us a feeling of pride to know that it had been our privilege to have contributed to the building of many of those main lines through our work and equipment. Which reminds me of what 'ole Zeke used to say, ". . . if a man ain't proud of his work—he ain't much fitten for it!"

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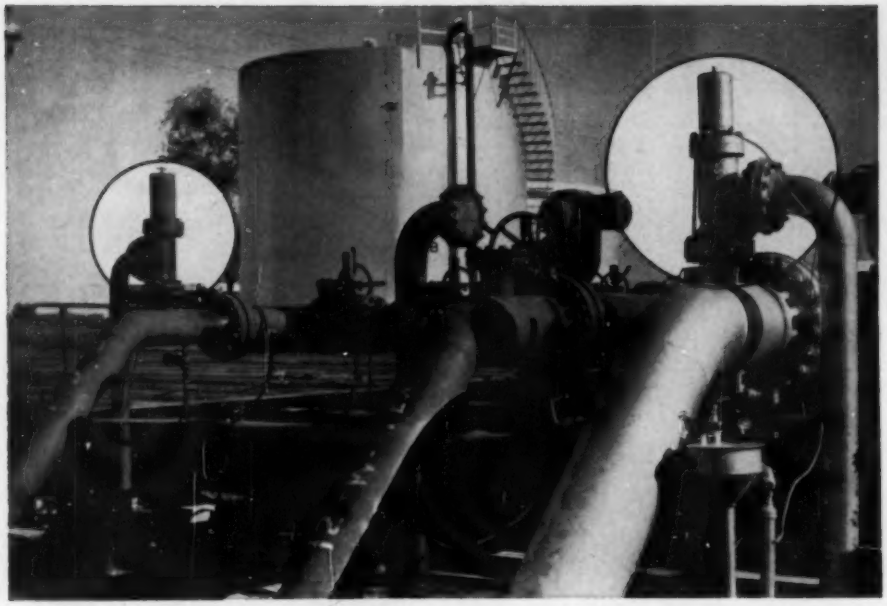

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John Kelly

A. C. Wilkinson

Eight men have been promoted to key positions in **Continental Pipe Line Company,** subsidiary of Continental Oil Company. The men, all of whom will make their headquarters at Ponca City, are **A. C. Wilkinson,** Ponca City, vice president and general manager of Continental Pipe Line Company, promoted to the newly created position of senior vice president; **John L. Kelly,** Wichita Falls, Texas, North Texas district superintendent, promoted to the newly created position of vice president-operations; **John D. Morrow,** Ponca City, administrative assistant to the president, promoted to the new position of coordinator and assistant to the president.

Also, **F. C. Whiteside,** Ponca City, chief engineer, promoted to the new position of manager of development and technical advisor; **William K. Burns,** Ponca City, senior office engineer, promoted to chief engineer, succeeding Whiteside; **Earl B. Webster,** Ponca City, assistant to the vice president and general manager, promoted to the new position of supervisor of oil movements; **C. Jay Plett,** Ponca City, chief clerk, promoted to the new position of supervisor of industrial relations; and **R. L. Sanders,** Spokane, Wash., office manager for Yellowstone Pipe Line Company, promoted to chief clerk for Continental Pipe Line Company, succeeding Plett.

•

P. F. Davis, assistant communications division superintendent of **The Texas Pipe Line Company** and superintendent, Communications divisions, of The Texas-Empire Pipe Line Company and Kaw Pipe Line Company, has retired after more than 38 years service.

Davis joined The Texas Company at Dallas in 1916. He was transferred to The Texas Pipe Line Company the

next year, then to Tulsa, from Wichita Falls in 1934. Since that time he has supervised the installation and maintenance of electrical equipment and communication facilities for the three companies in Oklahoma, Kansas, Missouri and Illinois.

•

J. D. Davis of Shreveport has been elected a director of **United Gas Pipe Line Company.** He is superintendent of the western pipe line division. A veteran of the oil and gas industry in the southwest, he has been connected with United Gas and a predecessor company for more than thirty years. In 1932, he was named district pipe line superintendent of the pipe line subsidiary of United Gas with headquarters at Jackson, Miss. He was promoted to the position of Jackson district manager of United Gas Pipe Line Company and Union Producing Company, United's production subsidiary, in 1940. He held that position continuously until his advancement to the Shreveport general office in July of this year.

P. H. DuVal has been elected vice president of **Arkansas Fuel Oil Corporation.** He will continue to serve, also, as vice president and general manager of Arkansas Pipeline Corporation, a position he has held since 1943, and manager of crude oil and gas purchases and sales of Arkansas Fuel Oil.

P. H. DuVal

DuVal has been with the Arkansas companies since 1929. After working a short time in the Land department, he was made superintendent of the Oil Pipe Line department and has since been connected with pipe line activities of the company.

•

Charles Fitzgerald was retired from **Sinclair Pipe Line Company** after 33 years with Sinclair and its predecessor companies. He began his career in November, 1921, as chief engineer of the Humphreys Pure Oil Pipe Line Company of Texas. After that company merged with Prairie, he became general superintendent of the Texas Division of The Prairie Pipe Line Company. At the time of the Sinclair-Prairie merger in 1932, he was named assistant to the president of Sinclair Prairie Pipe Line Company of Texas. His offices have been in Fort Worth, Texas, since 1932.

Fitzgerald served as a director of Texas-New Mexico Pipe Line Company from 1937 to 1952. In 1941 he was appointed assistant to the vice presidents of Sinclair Refining-Pipe Line department.

He was elected vice president in charge of the Texas Division of Sinclair Pipe Line Company in 1951, and vice president and director in 1952.

•

Two new assignments in the Products Pipe Line department of **Standard Oil Company's** Supply and Transportation department have been announced.

S. A. Hallberg, who has been superintendent of the projects and materials division of the Products Pipe Line department in the Chicago office became division superintendent of the Minneapolis, Minn., division. He replaces **S. L. Cox,** who died recently. **E. R. Carmody** succeeds Hall-

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berg as superintendent of the projects and materials division.

Hallberg joined Standard Oil in 1946 as an assistant products pipe line dispatching supervisor. He became superintendent of the projects and materials division in 1952.

Carmody joined the company's Production department in 1946 as an assistant petroleum engineer. Since 1947 he has been an administrative assistant in the operating division of the Products Pipe Line department.

George F. Peck, Temple, Texas, has been named superintendent of distribution properties in Oklahoma of the **Lone Star Gas Company.** He succeeds **Charles G. Barndt** who has been appointed to the newly created post of director of sales and promotion for Lone Star, with offices in Dallas. Peck will direct gas service maintenance and expansion operations in the 34 cities making up Lone Star's seven districts in southern Oklahoma.

E. C. Hurd

E. S. Davis

E. S. Davis has been appointed operating manager and **E. C. Hurd,** administration manager of **Trans Mountain Oil Pipe Line Company** following the retirement of **A. F. Terrill,** vice president and general manager. Terrill will be in charge of Trans Mountain's 1955 construction operations in the state of Washington.

For many years Davis was with the Manufacturing division of Imperial Oil Limited where his work included supervision of construction and operation of several plants in eastern and western Canada. He resigned as manager of Imperial's Winnipeg Refinery to join Trans Mountain as general superintendent.

Hurd was formerly with the British American Oil Company as manager of the Toronto refinery and later as assistant to the general manager of refineries. Before joining Trans Mountain in 1953, he supervised refinery operations for the Co-operative Refinery Association, Kansas City, Mo., and later, the Mercury Oil Refining Company of Oklahoma City.

•

L. E. Joses, Southern district general superintendent for **Standard Oil Company of California's** Pipe Line department, has retired. **E. B. Saunders,** who has been superintendent, Southern district, for the past three years, will succeed him.

Joses joined Standard in 1918 as an engineer in the Pipe Line department. He had been district general superintendent since 1943. Saunders has been with Standard since 1935.

C. L. Reasoner will succeed Saunders, and **R. R. McGill** will succeed Reasoner as contract superintendent (Los Angeles).

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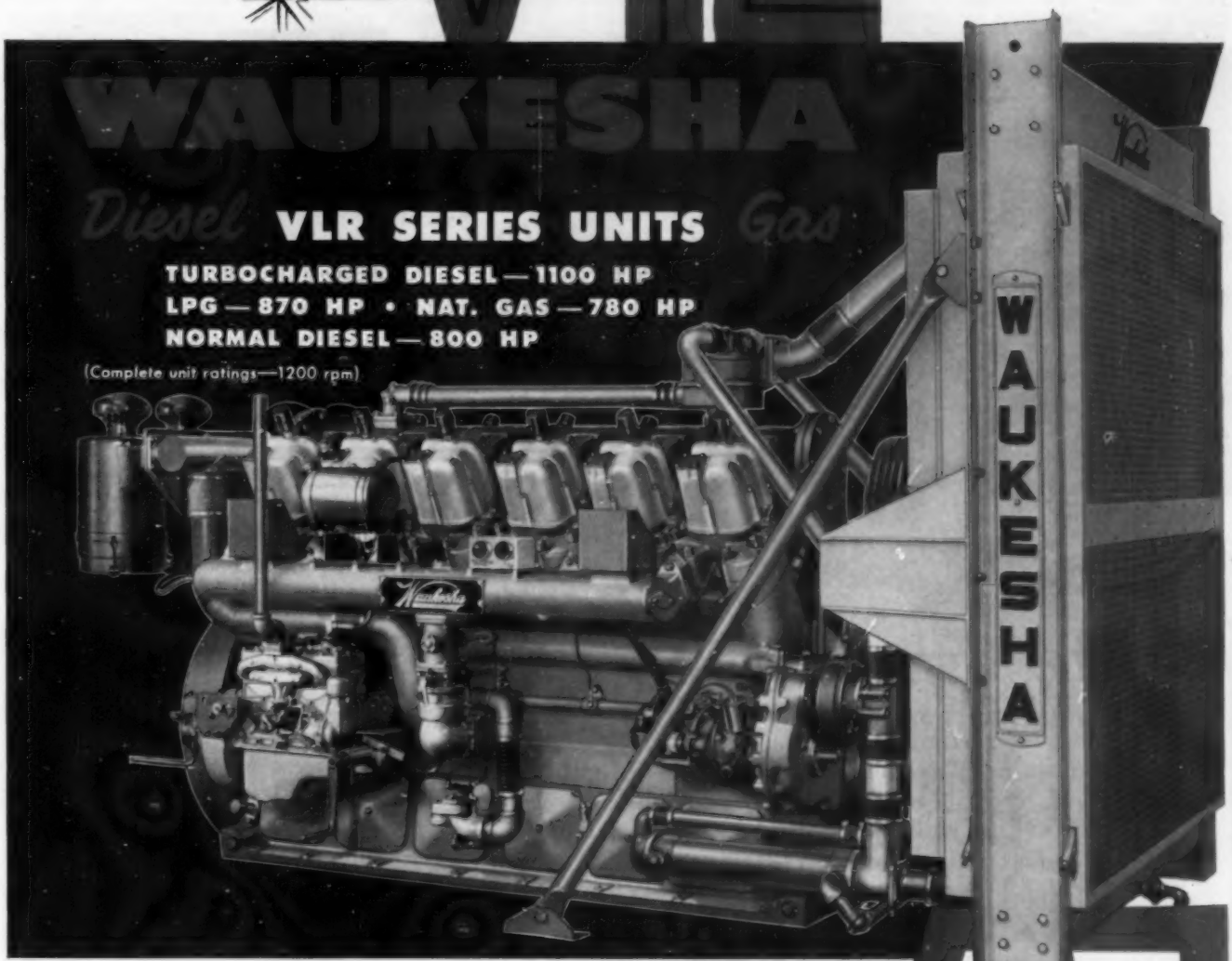

This powerful new Waukesha is a twelve-cylinder, high compression, overhead valve, 60-degree vee, four-cycle engine of 8½-inch bore and stroke, and 5788 cubic inch displacement. Connecting rods are side by side type; opposing pistons operating from a single wide-area crankpin. Bare engine ratings at 1200 rpm are: Turbocharged Diesel, 1135 hp; Normal Diesel, 830 hp; Butane-Propane, 900 hp; Natural Gas, 810 hp. Response to throttle and load requirements is quick and smooth, with a fast surge of reserve power for emergency and overload demands. Tremendous in power, remarkably rugged, the V-12 is designed for simplicity and reliability. Major parts are interchangeable between right and left cylinder banks. Main and rod bearings are easily accessible. Strength, precision and balance are built into all elements of the power train, from pistons to flywheel. Supporting members are designed for extreme rigidity and perfect alignment of moving parts. Send for Bulletin 1656.

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What's Happening

AMONG SERVICE AND SUPPLY MEN

Southwestern Plastic Pipe Announces Expansion Plans

Southwestern Plastic Pipe Company of Mineral Wells, Texas, has announced expansion plans. New equipment has been purchased and floor space will be doubled, according to J. F. Bailey, general manager of Texas Vitrified Pipe Company, parent company of Southwestern.

The company manufactures four different types of plastic pipe adapted for use in the oil fields and in gas and water lines. Sales are made principally through distributors on a world-wide basis with most attention devoted to oil fields where severe corrosion problems are costing producing companies large sums of money yearly.

STOP CORROSION AND PARAFFIN PROBLEMS WITH TUBE-KOTE PLASTIC PIPE

Here's how to eliminate corrosion and paraffin problems on gathering lines — install Tube-Kote Plastic Pipe! No need to wrap or tape because Tube-Kote Plastic Pipe will never rot, rust or corrode!

Use Tube-Kote Plastic Pipe and you will eliminate all corrosion problems at one time. You will also eliminate paraffin deposition and save shut-down time and maintenance costs. You will have a better pipe that will last years longer.

You can transport Tube-Kote Plastic Pipe for less cost, and install it in less time, because it is only 1/6 the weight of steel pipe!

Made by Tube-Kote, Inc. — world's largest processors of plastic coatings and linings for steel pipe—pioneers in plastics since 1939!

- Used throughout the industry for gathering lines, disposal lines, gas service lines, water lines, etc.
- Only 1/6 the weight of steel pipe—easier, faster to install.
- Smooth interior surface reduces friction loss—slashes pumping costs!
- No wrapping or taping needed—Tube-Kote Plastic Pipe is self-protective.

Write today for information and prices.

TUBE-KOTE, INC.
P. O. Box 20037 • Houston 25, Texas

TUBE-KOTE
First Name In Corrosion Resistance

TUBE-KOTE T.M. Reg.

New Sales Company Formed In Houston by W. B. Rawson

W. Brant Rawson has formed a new sales company, Rawson & Company, which will offer sales, service and warehousing facilities to manufacturers interested in the petro-chemical industrial trade area of Texas and Louisiana. Company offices are located at 4101 San Jacinto, Houston.

W. B. Rawson

Rawson, widely known in the oil, chemical, paper and power industries of Texas, Louisiana, and the Republic of Mexico, recently resigned his position of vice president of Maintenance Engineering Corporation of Houston.

He was graduated from Rice Institute in 1926 and was the only mechanical engineer selected from Rice that year by General Electric to enter their training course at the Lynn, Mass., plant. He returned to Houston after a year and a half of training. He joined Maintenance Engineering in 1927.

New Hydraulic Pipe Line Testing Service Company Is Formed

A new company has been formed to provide unitized pumping equipment for pipe line testing and other uses. Walnesco Hydraulic Pipeline Testing Service, with headquarters in Dallas, has Burt Hull, internationally known pipeliner, as associate and consultant. Don L. McCarty of Milwaukee, Wis., is consulting engineer.

Principal Walnesco equipment consists of Clark T-380-B Triplex piston-type pumps and Byron Jackson 6 x 8 x 10 two-stage centrifugal pumps, either skid-mounted or truck mounted. The pumps are all unitized with General Motors Twin-6 diesel engines rated at 325 horsepower. The triplex pumps are driven through Twin-Disc torque converters. Trained operating engineers are available if desired.

Thew Shovel Acquires Control Of Dixie Crane & Shovel Company

Arrangements have been completed by the Thew Shovel Company of Lorain, Ohio, for purchase of the controlling stock of Dixie Crane & Shovel Company, Inc., of Harrisburg, Penn.

Acquisition was made to put Thew in the low-cost crawler and rubber tire mounted, 3/8-yard, 6-ton shovel-crane market. The Dixie Crane line will continue to be manufactured and distributed by Dixie Crane, under that brand name.

Three officers and directors of Thew Shovel have been elected directors of Dixie Crane and Shovel. In addition to C. B. Smythe, president, they are Waid V. Clark and Arthur C. Lundgren. Benjamin Jenkins and David Jenkins, president of Dixie Crane and Shovel, remain on the board.

Something more than skill

In addition to a completely integrated, expertly staffed organization, Houston Contracting Co. has the extra measure of coordinated teamwork and pride in achievement that means pipeline construction of the highest calibre.

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for cutting steel or cast iron pipe . . .

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Rachet
PIPE CUTTER

There's none better for SPEED, SAFETY, POWER, ACCURACY and ECONOMY. It eliminates dangerous sparks . . . broken cutters; rollers hold pipe taut after cutting. It's easy on and off pipe . . . will cut 10" pipe in 12 min. Patented roller guides. Rachet makes it easy to work in close places.

A size for every requirement . . . write for details, literature and prices.

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Nozzle sizes from ¼" to 24"

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Nominal pipe sizes 1" to 30"

Special sizes and lengths. Schedules 10 to 160

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Metal cabinet map file with locking doors. 112 tilting tubes. Easy to file and find maps, tracings to 60".

Ideal for home and field offices.

PATENT NO. 1610368 Other Patents Pending

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Sales Conference Held

Shand and Jurs Company held its third general sales conference recently to acquaint people in the outside sales organization with improvements in layout, machine tool equipment, and production made in recent years. Those participating in the week-long program were, left to right, Ralph Cayford, Montreal; Paul Neves, Seattle; R. W. Blake, Chicago; Cliff Loat, Vancouver, B. C.; A. E. Jurs, Sr., Berkeley; Ralph F. Ley, New York; Ralph H. Smith, Los Angeles; P. C. Jurs, Berkeley; J. M. Greenlee, Houston; E. E. Jurs, Berkeley; R. J. Echeverria, Berkeley; H. M. Durlam, Chicago; R. M. Young, Berkeley; Breen Ringland, Tulsa; J. T. Drumm, New York; and A. E. Jurs, Jr., Berkeley. Cayford is of Lytle Engineering Specialties, Ltd.; Neves is with Nebar Supply Company; and Loat represents P. D. McLaren & Son. All others pictured are with Shand and Jurs Company.

H. N. Mallon Elected Director Of American Gas Association

H. N. Mallon, president, Dresser Industries, Inc., Dallas, was elected a director of the American Gas Association at the 36th annual convention of the association at Atlantic City, N. J. He was elected for a two-year term, expiring in October, 1956.

Mallon was born in Cincinnati, Ohio, and was graduated from Yale University with a B.A. degree in 1917. He joined the U. S. Can Company in 1920 as a factory worker and became successively: factory manager; vice president and general manager, and director; president and general manager, S. R. Dresser Manufacturing Company, predecessor company to Dresser Industries.

He is currently chairman of the board of Bovaird & Seyfang Manufacturing Company, Bradford, Penn., Dresser Equipment Company, Dallas, and Dresser Operations, Inc., Whittier, Calif., and Olean, N. Y. He is a director of the above named Dresser companies, and also of Dresser Manufacturing Company, Toronto, and Dresser-Stacey Company, Cincinnati and Columbus, Ohio.

Mallon also serves as a director for Magnet Cove Barium Corporation, Houston; Pacific Pumps, Inc., Huntington Park; Petrolite Corporation, St. Louis; Wescol Oil & Gas Company, Houston.

Active in gas industry affairs for many years, Mallon has served previously as a director of A. G. A. and has been on many of its important committees.

Other officers of A. G. A. elected at the convention included: F. M. Banks, president, Southern California Gas Company, A. G. A. president; Dean H. Mitchell, president, Northern Indiana Public Service Company, Hammond, Ind., first vice president; C. H. Zachry, president, Southern Union Gas Company, Dallas, second vice president; and Vincent T. Miles, treasurer, Long Island Lighting Company, Mineola, N. Y., treasurer.

Specify - ROACH

Automatic Shut-Off Valves

The answer to the Industry's request for high quality shut-off valve. The ROACH valve offers dependable, sure shut-off action with absolute accuracy, by means of precision timing mechanism built into all-weather cast aluminum case.

For particulars on the Roach valve, Send for our new bulletin #101.

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Reinforced GUNITE COATING being applied to pipe.

Your inquiry solicited.

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CHICAGO — ST. LOUIS — DENVER
MINNEAPOLIS — NEW ORLEANS

Two Receive Promotions At Gar Wood Industries

Gar Wood Industries, Wayne, Mich., has appointed R. F. Whitworth assistant director of sales, branch operations. He will manage the operations of the company's direct factory truck equipment sales branches at New York, Detroit, Chicago, Albany, Springfield, Ill., Tulsa, Washington, D. C., Minneapolis, Buffalo, Boston, Philadelphia and Baltimore.

R. F. Whitworth

Leif Unstad has been named manager of the Minneapolis, Minn., direct factory truck equipment sales branch. He was formerly manager of Omana Standard Body Company's St. Paul, Minn., factory branch, and has had broad truck equipment sales experience in hoists, dump bodies and trailers.

Whitworth has held a number of executive positions in the Gar Wood corporation, including that of sales manager for national accounts, general service manager, general sales department manager and division sales coordinator.

Thornhill-Graver Names Horn Manager Pipe Line Sales

Thornhill-Craver Company, Houston, manufacturers of Unibolt products and jet type pipe line strainers, has announced the promotion of Clint Horn to the position of sales manager of the company's Pipeline Products Division.

Clint Horn

For the past four years Horn has served as Unibolt district salesman in Oklahoma City. He has been with the company six years.

American Blower Names Wilson Credit Manager

Deane H. Wilson has been appointed credit manager of American Blower Corporation of Dearborn, Mich.

A graduate of Dartmouth Graduate School of Credit and Financial Management, Wilson worked in the Credit department from 1941 to 1949. Since that time he has been credit manager of Evans Products Company in Plymouth, Mich.

Mitchell Promoted to Manager Of Bethlehem's Louisiana Store

W. Q. Mitchell has been promoted to store manager of the Bethlehem Supply Company's Shreveport, La., store.

With Bethlehem 24 years, Mitchell has had considerable experience in the oil field supply business at East Texas and Northern Louisiana. He was store manager at Winnsboro for five years before being transferred to Shreveport in 1953 as assistant store manager.

Three Great Pipe Threaders

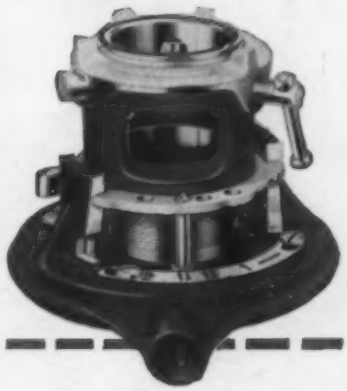
Fast, Easy, Trouble-Free

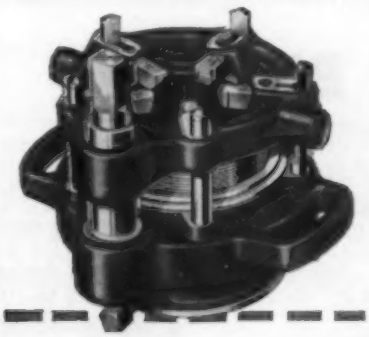
RIDGID

Every Tool Fully Tested Before Shipment

RIDGID 65R

Threads 1" to 2" pipe with 1 set of dies —and it won't jam. Sets to pipe size in 10 seconds! Workholder sets to size instantly. 65R's great popularity has been earned on thousands of tough jobs.



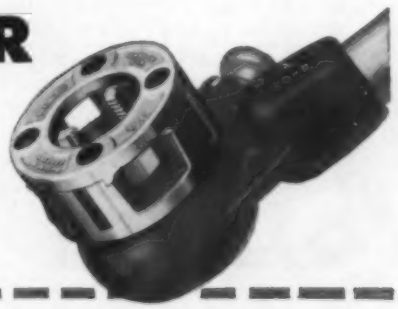


RIDGID 4P

For 2½" to 4" pipe—4 sets of 5 dies. Loop handles make it easy to carry, put on pipe. Workholder sets easily to size *before* putting on pipe. Easy upkeep, oilless bronze bearings.

RIDGID 00R

Drop-head dies, ⅛" to 1", snap into drive ring, can't fall out. Dies reverse for close-to-wall threads—no special dies needed. Other sets in any combination of sizes from ⅛" to 2".



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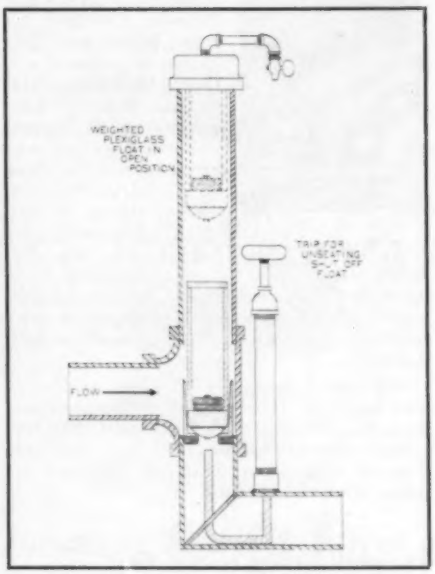

Automatic Tank Bleeder

A labor-saving device new on the market is the Cronkhite automatic tank bleeder. It automatically stops flow from tanks without loss of oil when all salt water is exhausted.

The basic part of the bleeder is a Cronkhite shut-off valve designed to stop automatically the flow of all fluids from a tank when nearly empty. When assembled, the new labor saver is a three-foot vertical cylinder four inches in diameter. Traveling in this cylinder is a mercury weighted plastic float with a built-in shut-off seat plug. The float is loaded with just enough mercury to enable it to remain at the water-oil contact with the seat plug below the contact.

The vertical cylinder fastens into a tee which becomes part of the tank's discharge line. This tee has a built-in seat in which the plastic float seat plug rests when water in the tank has reached a predetermined level. There is a control lever built into the tee so the bleed can be manually operated or used automatically.

For more data circle **No. E1** on Readers' Service Card, last page this issue.

Chain Repair Links

A new product to enable dragline operators to repair drag chains with greater speed and ease has been designed by Electric Steel Foundry Company. It consists of the repair links, the hinge pin and a newly developed tightly compressed coil spring that grips the pin, replacing the elliptical collar formerly used.

Dimensional tolerances of this spring are such that upon driving the hinge pin into the spring, the spring is expanded radially, well within the elastic limit of the spring material. When in service the spring material acts as a continual grip on the pin and in continued use has a tendency to grip harder rather than to loosen. These new repair links provide ease of installation, strength, and abrasion resistance. No special tools are needed for installation and links can be installed in a matter of minutes with an ordinary hammer. Complete details are available on this new item now.

For more data circle **No. E2** on Readers' Service Card, last page this issue.

Packing Selector

Here is a packing selector so easy to use a layman can pick out the right packing for almost any application in a matter of seconds.

The selector, a cardboard disc six inches in diameter, developed by New York Belting & Packing Company, and available free to the trade, is speedier than the present method of hunting through packing catalogs, and more accurate. Manufacturers' catalogs give many packing choices for the same set of conditions, but the selector automatically picks the most economical one.

Shown on the circular selector are packing styles and pressure and temperature readings for the four types of packing application, i.e., gaskets, valve stems and centrifugal and reciprocating pumps.

The material being handled, water, steam, brine, ammonia, etc., is printed alongside a window in a second and smaller disc mounted on the larger one.

The correct packing shows up in the window alongside the material being handled as the smaller disc is rotated in ac-

Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue.

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Another Efficient

Viking pumps are giving top performance wherever used in the pipe-line industry. The above installation is serving a major pipeline company and consists of: a Viking Model L-124, Size 2" Standard fitted heavy duty rotary pump mounted on welded steel skids and direct connected through 7 F Falk coupling to a 2 cylinder Air Cooled Power Unit.

Write for new literature or engineering counsel.

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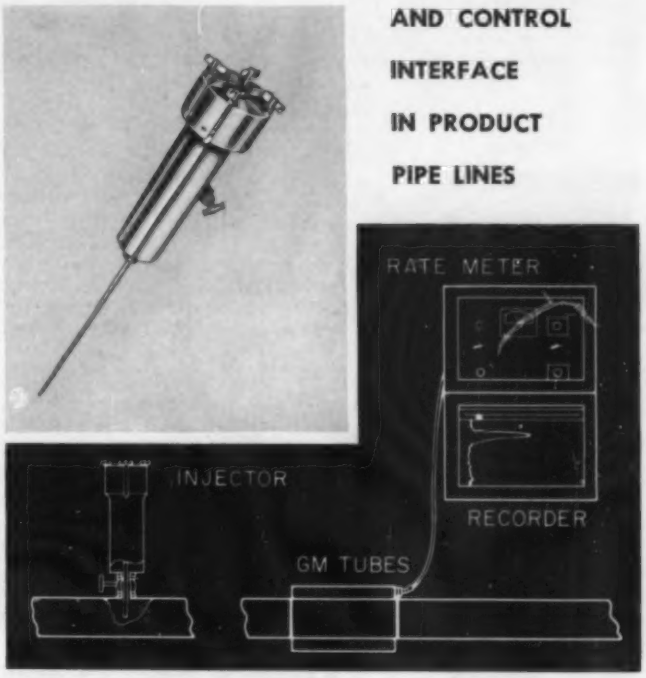
Problem: ACCURATELY LOCATE AND CONTROL INTERFACE IN PRODUCT PIPE LINES



Solution: RADIOACTIVE INTERFACE MARKING SYSTEM

Description of Application: A simple Tracerlab injection device which fits a standard ½-inch gate valve contains a sealed capsule of a short-lived radioisotope and a small CO_2 cartridge. When the interface reaches the valve, injection of the isotope is made in a fraction of a second by a trigger which releases the CO_2. The radioactive tracer travels with the interface and signals its location and the extent of product commingling both at automatic booster pump stations (where pumps can be started by the radioactivity) and at terminals and intermediate take off points. Geiger tubes attached to the outside of the line pick up a signal from the tracer and feed this signal into counting rate meter-recorder combinations at take off points and at the line terminus. This information may be telemetered ahead to warn operators or to operate pumps or valves automatically. Advantages of the method are reduced slop cuts, closer product control through more accurate measurement of commingling, and the savings in operator time through the elimination of sampling. Complete equipment, including regular shipments of sealed isotope capsules, is available from Tracerlab.

For a complete report on the economies of interface tagging, request papers Nos. 76-53.

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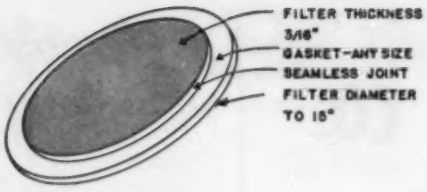
For more data on advertised products, use Readers' Service Cards, last page.

cordance with the conditions of the application. The reverse side of the "wheel" gives the sizes in which the recommended packing is available.

For more data circle **No. E3** on Readers' Service Card, last page this issue.

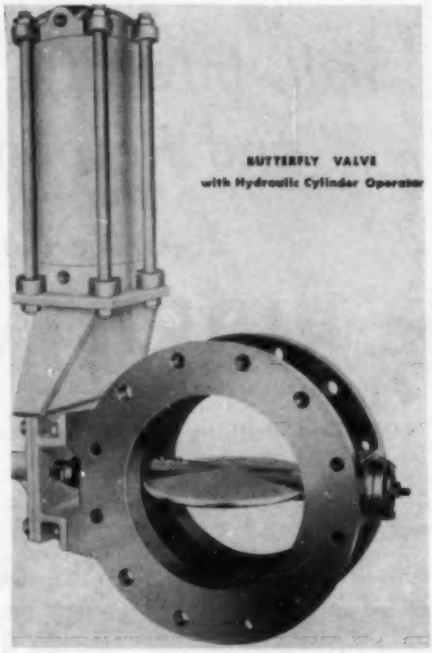


Teflon Filters

Porous Plastic Filter Company has announced the availability of porous teflon filters. Teflon is the chemically inert, high temperature plastic produced by Du Pont. By using a sintering and molding process without the aid of any additives or plasticizers, porous Teflon filter medium is being produced which has all the outstanding corrosion resistance and temperature stability properties of solid Teflon.

Porous Teflon has a mean pore size of nine microns and will filter out of liquids all particles having diameters larger than three microns. In gas filtration all particles as small as one micron will be removed. Flow capacities as high as 45 gallons per minute per square foot of filter at five pounds per square inch differential pressure can be anticipated for organic fluids of 1 centipoise viscosity. This product makes possible the filtration and dispersion of all liquids and gases, thus presenting a universal filter medium suitable for use with all commercial acids, caustic and organic solvents including such severe corrosives as fuming nitric acid, acid, aqua regia and hydrogen peroxide.

For more data circle **No. E4** on Readers' Service Card, last page this issue.



Butterfly Valves

Builders-Providence, Inc., a division of B-I-F Industries, Inc., has announced that it is extending its line of butterfly valves to include rubber-seated, tight-closing butterfly valves for general service. Utilitarian design and rugged construction are combined for positive, trouble-free performance in these valves which meet the American Water Works Association's Tentative Standard Specifications for rubber-seated butterfly valves, AWWA C504-54T. Accessories include manual, electric, hydraulic and pneumatic operators.

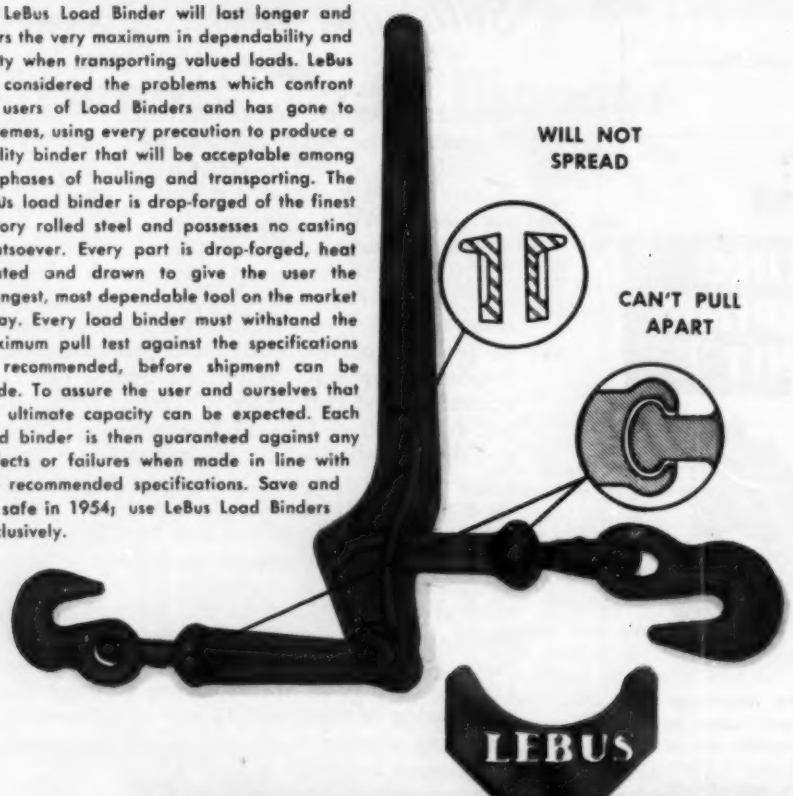
This recent addition supplements B-I-F Industries' line of butterfly control valves offered for many years and accommodates the increasing need on the part of industrial and water and sewage works engineers, for an efficient, versatile and tight-closing valve.

For more data circle **No. E5** on Readers' Service Card, last page this issue.

MORE STAMINA

. . . LeBus Load Binders

The LeBus Load Binder will last longer and offers the very maximum in dependability and safety when transporting valued loads. LeBus has considered the problems which confront the users of Load Binders and has gone to extremes, using every precaution to produce a quality binder that will be acceptable among all phases of hauling and transporting. The LeBus load binder is drop-forged of the finest factory rolled steel and possesses no casting whatsoever. Every part is drop-forged, heat treated and drawn to give the user the strongest, most dependable tool on the market today. Every load binder must withstand the maximum pull test against the specifications as recommended, before shipment can be made. To assure the user and ourselves that the ultimate capacity can be expected. Each load binder is then guaranteed against any defects or failures when made in line with the recommended specifications. Save and be safe in 1954; use LeBus Load Binders exclusively.



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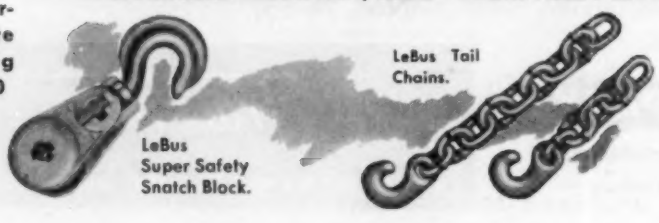
For more information write for catalog page #100



Circle numbers on Readers' Service Cards, last page this issue.

Literature

Line Blinds

The M. N. Aitken Company has issued a new 12-page catalog giving standard dimensions and specifications for a standard series of line blinds made under the trade name of "micro-blanks." Heretofore, no standards have existed on these items and each company made its own drawings and specifications and had the blanks custom-made at considerable extra time and expense. From this new catalog, a standard "micro-blank" can be selected to meet requirements and ordered by code number.

To get a copy, circle **No. E6** on Readers' Service Card, last page this issue.

Pressure Instruments

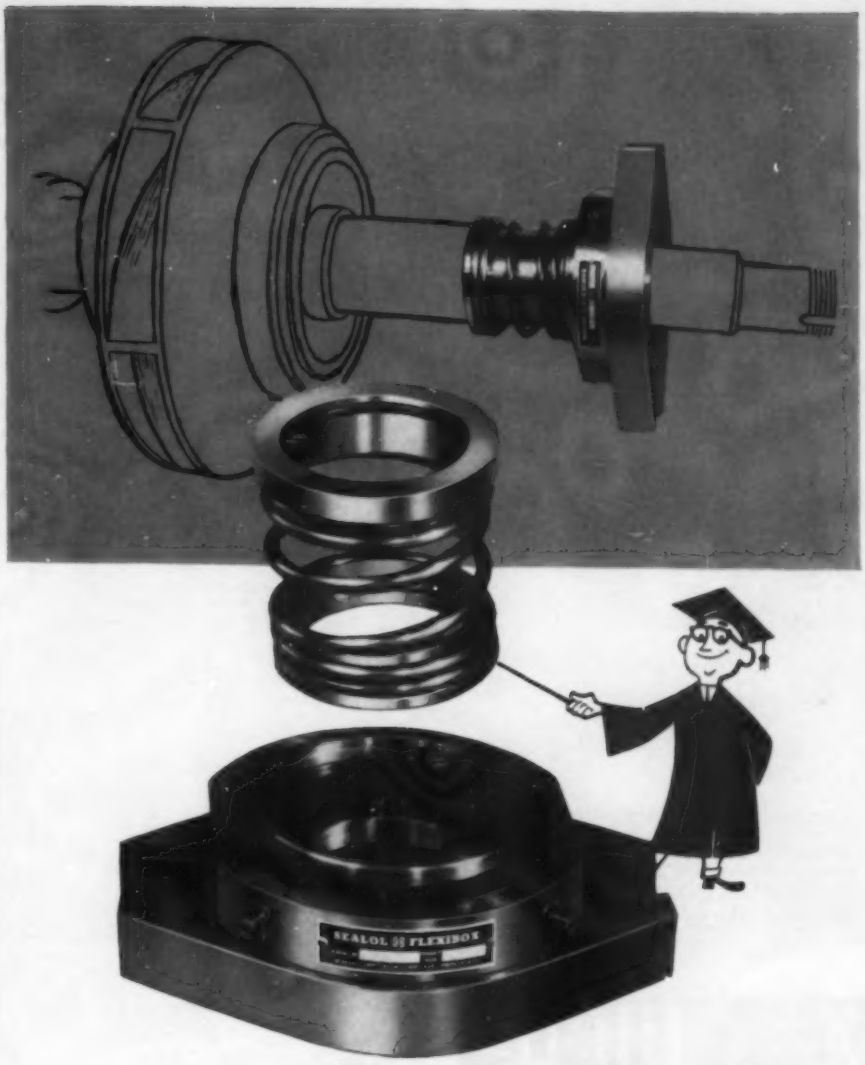
A completely new line of pressure measuring elements is graphically described in a new bulletin "Pressure Recorders," just issued by The Foxboro Company. The 24-page publication explains the company's line of pressure instruments designed for direct measurement, remote transmission and automatic control, and widely used in instrumenting the more specialized processes of industry. An application chart "How to Select the Measuring Element" shows the wide choice of element materials available, such as corrosion-resistant Type 316 stainless steel; beryllium copper with its fine spring characteristics; and Ni-Span, notably unaffected by ambient temperatures. The exclusive Foxboro high pressure helical for pressures to 80,000 pounds per square inch, as well as the diaphragm, bellows, spiral and standard helical covering ranges from 10 inches of water to 6000 psi, are diagrammed and explained. Exact ranges are listed for each material and each type of element.

To get a copy, circle **No. E7** on Readers' Service Card, last page this issue.

Cathodic Protection Booklet

A new booklet covering the "whys" and "hows" of cathodic protection is announced by National Carbon Company, a division of Union Carbide and Carbon Corporation. This catalog section is a complete reference work on the mitigation of corrosion of underground and submerged metal structures by the application of an impressed current cathodic protection system using "National" graphite anodes. Slanted toward both the management executive and the engineer, the booklet contains valuable information on the cost of corrosion; the economics of cathodic protection; where and when it can and should be applied; facts about impressed current systems and how they should be installed; typical ground bed installation details including design notes and tabulation of material requirements.

To get a copy, circle **No. E8** on Readers' Service Card, last page this issue.



make the quick change to Sealol Flexibox

No special skills are required to make the quick change-over from a conventional stuffing box to a Sealol-Flexibox Mechanical Shaft Seal. There are no measurements to make, and no special machining is required.

Once the change to Sealol-Flexibox has been completed, however, you will find a tremendous difference in shaft sealing efficiency. You eliminate stuffing box drip. Your pumproom floors are cleaner. The constant fire hazard of escaping volatiles is eliminated. Wastage of valuable product is stopped.

Find out for yourself why many world famous refineries and pipeline companies have standardized on Sealol-Flexibox Mechanical Shaft Seals. Send for operating data, typical case histories, and Bulletin 9. Sealol Corporation, 23 Willard Avenue, Providence 5, Rhode Island.

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CHARLESTON (W. VA.) • ST. LOUIS
TULSA • EDMONTON — TORONTO, CAN.

THE BALANCED PRESSURE SEAL

KILL

Corrosion and Clogging

in

PIPE LINES
TANKS
OIL !

Instant Acting

SABANOL

THE HOMOGENIZING FUEL OIL TREATMENT

Does It

Like Nothing Else!

Ask us why Pipe Line and Petroleum Companies are availing themselves of this NEW DISCOVERY!

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Established 1926
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SAND BANUM

HIGH *Efficiency with* **FRANCE**

You engineers know that a bakelite material, that can remain unchanged for *15 hours, under critical operating conditions, while competitive products under similar test conditions were destroyed, is a proved: highly effective material.

FRANCE CARBON-BAKELITE PISTON RINGS for your gas compressors will outlast any comparable material—no deterioration with age or use; not affected by wet or sour gases.

*Data on complete test available on request.

CARBON BAKELITE PISTON RINGS

Write for Complete Information

MAXIMUM SERVICE for you in our NEW PLANT

FRANCE PACKING COMPANY

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• Dot preceding name of advertiser indicates that detailed data on products and services of the firm will be found in current 20th (1953-54) edition of The Composite Catalog of Oil Field and Pipe Line Equipment.

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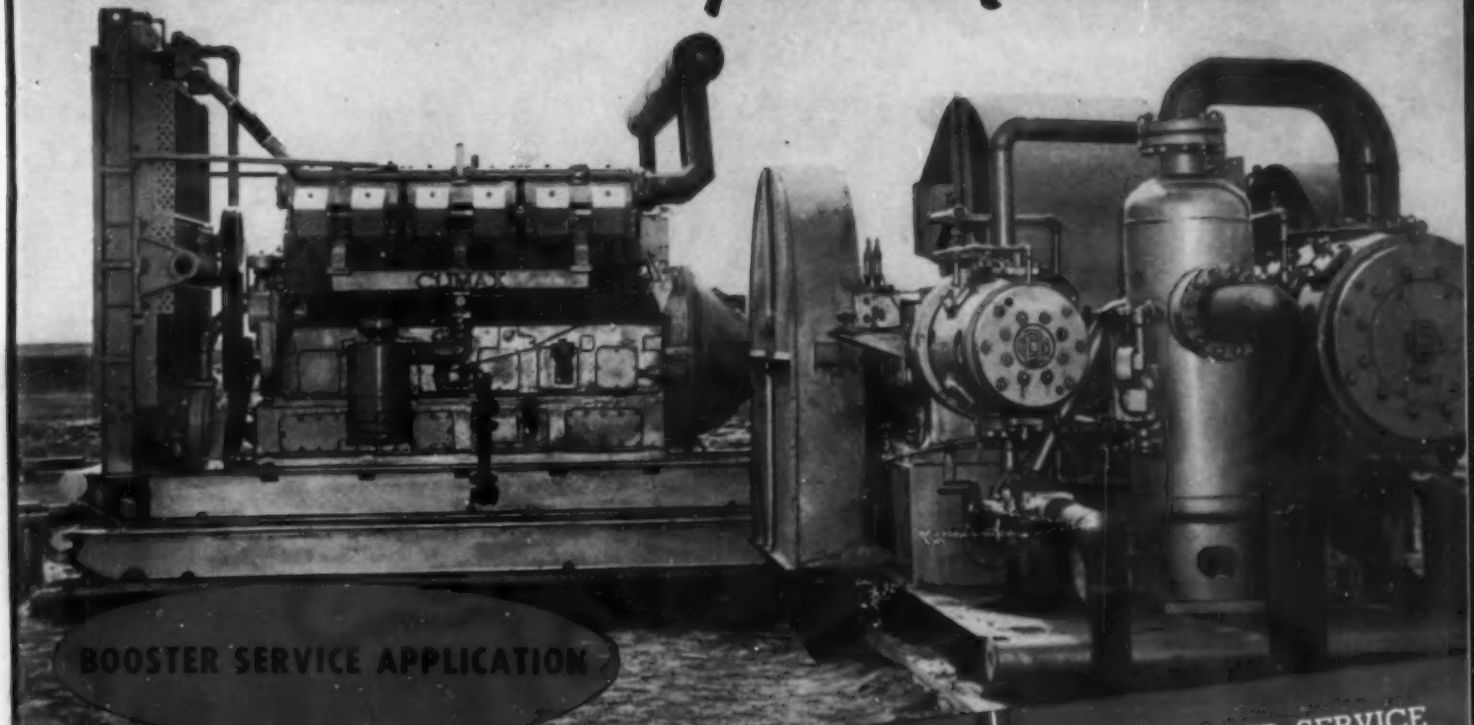

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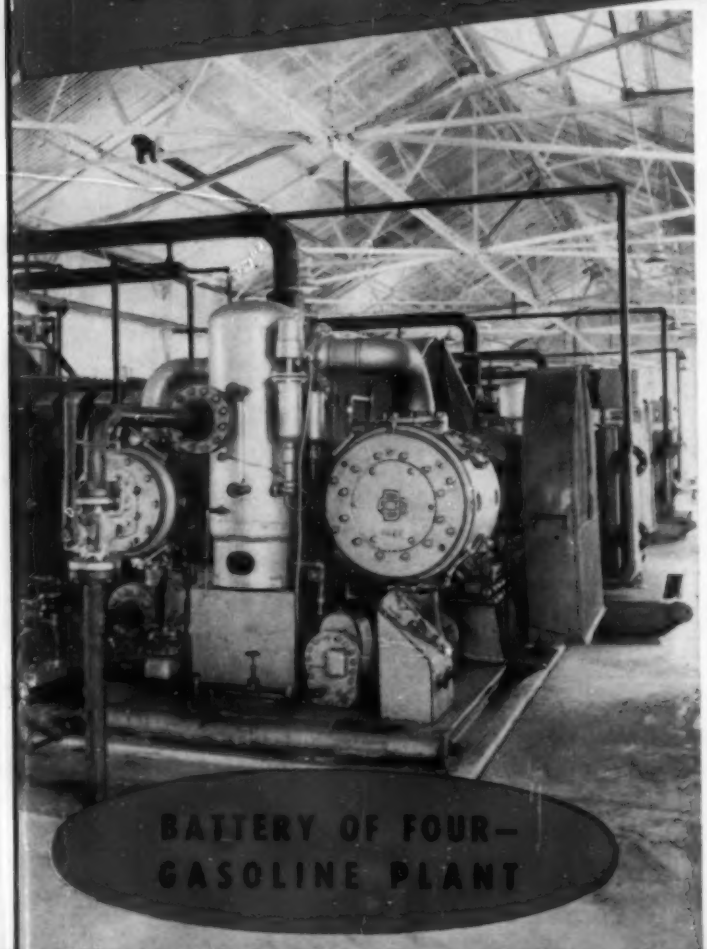

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